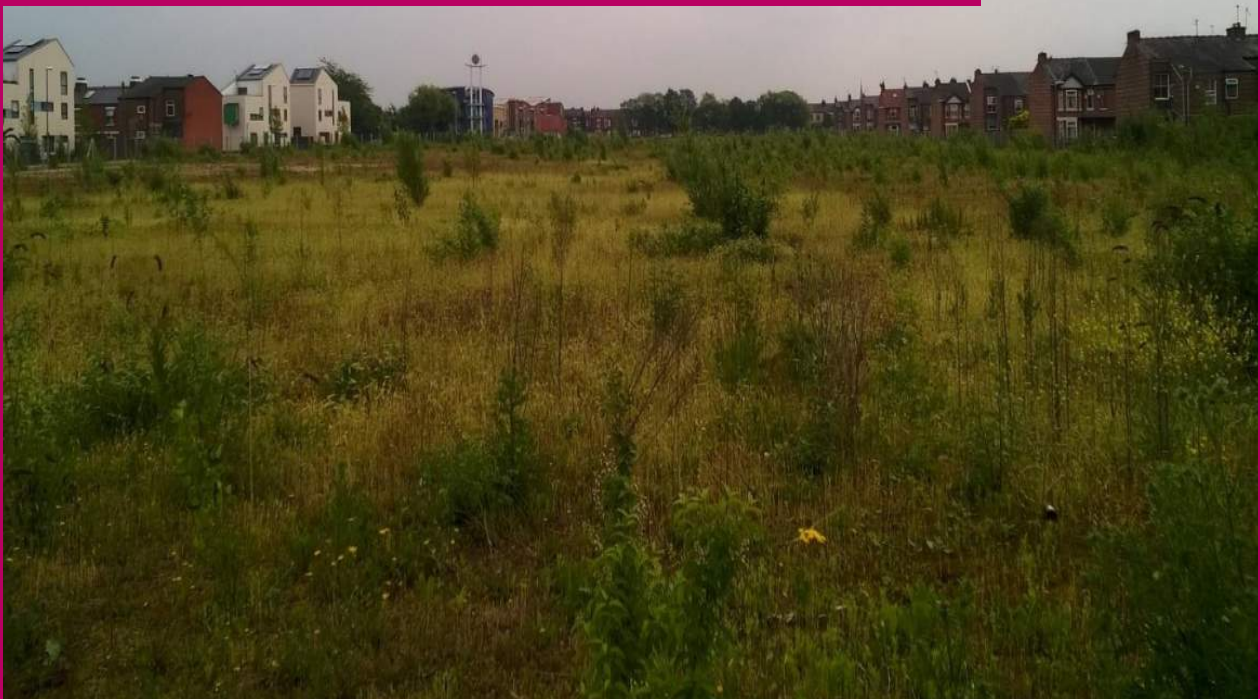


Bowes Street

Phase 2 Ground Investigation & Assessment

March 2017



Quality Management

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Prepared by	Elizabeth Yeatman	Signature (for file)	
Checked by	Andrew Watts	Signature (for file)	
Authorised by	Dan Mason	Signature (for file)	

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1. Introduction

1.1 Appointment

- 1.1.1 Capita Property and Infrastructure Ltd ("Capita") was commissioned by Rowlinson Constructions Ltd to undertake an intrusive Phase 2 Geo-Environmental Ground Investigation for the proposed residential development of a parcel of land to the south of Bowes Street in Moss Side, Manchester.
- 1.1.2 A site location and existing site layout plan is presented in Appendix A.

1.2 Proposed Development

- 1.2.1 The site is being considered for redevelopment to comprise an Extra Care unit on the western area of the site fronting Princess Road with residential apartments and houses across the remainder of the site with associated access roads, car parking and landscaping.

1.3 Background

- 1.3.1 Previous ground investigations were undertaken at the site in 2011 whilst the site remained in its former configuration as a Stagecoach bus depot. The full report references are as follows:
- Phase 1 Detailed Desk Top Study, Former Stagecoach Depot Princess Road Manchester. Prepared for Manchester City Council (MCC) by Curtins Consulting Ltd. Report ref: 50721/PDW/1641, May 2011.
 - Phase 2 Intrusive Investigation, Former Stagecoach Depot Princess Road Manchester. Prepared for MCC by Curtins Consulting Ltd. Report ref: 50721/DM/1764, August 2011.
- 1.3.2 A further Phase 3 Intrusive Investigation was later undertaken by Beech Consultants Ltd during the above ground demolition works; this was used to establish a Remedial Strategy for the site. The full report reference is as follows:
- Phase III Site Investigation & Remedial Strategy, Former Moss Side (Stagecoach) Bus Depot. Prepared for GB Building Solutions & MCC by Beech Consultants Ltd. Report ref: BC/1702/685/R5, October 2011.
- 1.3.3 Beech Remediation were subsequently appointed by GB-Building Solutions Limited as a specialist remediation sub-contractor to undertake the remediation of the site. Remediation Contract Works commenced following completion of above ground demolition. Validation of the works was undertaken in accordance with the agreed Remedial Strategy.
- 1.3.4 The following summary validation report provides a compilation list of the various individual Validation Reports prepared for the site:
- Remediation Works Contract- Validation Report- Summary, Former Moss Side (Stagecoach) Bus Depot, Manchester. Prepared for GB Building Solutions & MCC by Beech Consultants Ltd. Report ref: BC/1702/691/R1, July 2012.

- 1.3.5 The above reports and the individual validation reports were reviewed, and a detailed summary of the previous investigation and remediation works is presented in Section 5 of the 2016 Capita Phase 1 Desk Study. The full report reference is as follows:
- Phase 1 Geo-Environmental Desk Study, Bowes Street, Manchester, for Rowlinson Constructions Ltd. Capita Ref: CS088198-P1DS-03; dated August 2016.
- 1.3.6 In general the conclusions of the Phase 1 Desk Study were that the identified historical land use of the site and surrounding area may have generated significant contamination impacts. The preliminary risks associated with any “active” Contaminant-Pathway-Receptor linkages were in the majority of cases considered to be Low to Moderate.
- 1.3.7 This was largely due to the comprehensive remedial work which has previously been undertaken at the site. However, given the historic use of the site and the extent of contamination previously identified, it is considered possible that small scale contamination impacts may remain. The risk has therefore been assessed as low to moderate given the sensitivity of the proposed end-use is high.
- 1.3.8 The remedial measures which have previously been undertaken were done so in accordance with a Remediation Strategy intended to provide a site for residential re-development that will require the import of suitable clean capping material in all garden and landscaping areas and a suitable vapour barrier in all dwellings and structures at the site. It can therefore be inferred that chemical contamination may exist in shallow soils across the site exceeding human health criteria. Furthermore a potential risk is considered to exist from hazardous ground gas until proven otherwise or is quantified with appropriate recommendations for mitigation measures.
- 1.3.9 The environmental risk posed by the site to Controlled Water receptors is not anticipated to be significant considering the results of previous water sampling and chemical analysis; however this should be confirmed by groundwater testing and risk assessment during supplementary investigations considering the sensitivity of the underlying Principal Bedrock Aquifer.
- 1.3.10 Given the bulk infill of deep excavations across the site during the remediation works a geotechnical investigation should be undertaken to identify the depth to competent bearing strata.

1.4 Objective and Scope of Work

- 1.4.1 The objectives of this assessment were to obtain geotechnical design parameters for the proposed development and to establish the nature of the shallow ground conditions from a “land contamination” perspective (including ground gas). It was therefore necessary to:
1. Characterise the geological and hydrogeological conditions beneath the site;
 2. Collect sufficient information to allow a development specific geotechnical appraisal to be undertaken;
 3. Quantify the level of ground contamination present within any Made Ground and shallow strata across the site and assess this in terms of the proposed development;

4. Quantify the level of contamination present within the underlying aquifer with respect to the former Bus Depot which once resided on the site.
5. Establish the ground gas regime at the site and assess this in terms of the proposed development;
6. Provide recommendations for cost effective remediation/mitigation where required.

1.4.2 To achieve the objectives the following scope of work was defined and undertaken:

- Formation of 6no window sample boreholes with coring attachment including in-situ geotechnical testing;
- Formation of 30no machine excavated trial pits;
- Formation of 2no rotary open boreholes;
- Formation of 25no machine excavated delineation trial pits;
- Installation of 8no gas and groundwater monitoring wells;
- Sampling and laboratory testing of soil and groundwater for chemical and geotechnical purposes;
- Ground gas monitoring (6no visits over 3no months, plus additional 2no visits); and
- Provision of a combined factual and interpretive report.

2. Site Investigation

2.1 Intrusive Works

2.1.1 To achieve the project objectives, the following scope of site work was defined and undertaken:

- Formation of 6no window sample boreholes with coring attachment including in-situ geotechnical testing;
- Formation of 30no machine excavated trial pits;
- Installation of 6no gas and groundwater monitoring wells;
- Sampling and laboratory testing of soil and groundwater for chemical and geotechnical purposes; and
- Ground gas monitoring (6no visits over 3no months).

2.1.2 The boreholes were formed by Rotary Test Drilling Ltd under the supervision and direction of a suitably qualified and experienced Capita engineer and were formed to a maximum depth of 6.95mbgl. The boreholes were generally located to give a reasonable site wide coverage over the accessible areas and to target areas of future potential development and areas of potential deep fill.

2.1.3 In-situ strength tests comprising Standard Penetration Tests (SPT's) were undertaken in the boreholes at regular intervals.

2.1.4 The Machine excavated trial pits were formed to a maximum depth of 4.50mbgl and were distributed to allow for good site coverage to assess the geotechnical and environmental properties of the underlying soils at the subject site and to target areas of potential contamination concern.

2.1.5 An additional phase of intrusive investigation was subsequently undertaken comprising:

- Formation of 2no rotary open boreholes;
- Formation of 25no machine excavated delineation trial pits; and
- Installation of 2no groundwater monitoring wells.

2.1.6 The rotary boreholes were formed by Danbar Drilling Ltd under the supervision and direction of a suitably qualified and experienced Capita engineer and were formed to a maximum depth of 10.00mbgl. The boreholes were generally located at each end of the site to allow for sampling of the deep groundwater beneath the site.

2.1.7 The delineation trial pits were formed to a maximum depth of 3.60mbgl and were distributed to delineate an area of Naphthalene and volatile hydrocarbon contamination identified during the earlier phase of investigation.

2.1.8 2no further gas and groundwater monitoring visits were undertaken during this later phase of site works to allow for the sampling of deep groundwater from the rotary boreholes and sampling of gas within a window sample borehole.

- 2.1.9 The exploratory hole logs are presented in Appendix B and an exploratory hole location plan is presented in Appendix A.

2.2 Monitoring Well Installations

- 2.2.1 Gas and groundwater monitoring wells were installed in boreholes BH201-BH206 and BH301-BH302 during the Capita investigation, the details of which are shown on the exploratory hole logs within Appendix B.
- 2.2.2 Monitoring wells were constructed of 50mm diameter HDPE well screen. The following table provides details of the monitoring well installations:

Well	Depth to Base (mbgl)	Response Zone (mbgl)	Response Zone Target Lithology
BH201	2.45	1.00 – 2.00	Glacial Till/Chester Pebble Beds (Sherwood Sandstone)
BH202	2.26	1.10 – 2.26	Chester Pebble Beds (Sherwood Sandstone)
BH203	3.45	1.50 – 3.00	Glacial Till/Chester Pebble Beds (Sherwood Sandstone)
BH204	3.45	1.00 – 3.45	Glacial Till/Chester Pebble Beds (Sherwood Sandstone)
BH205	4.95	1.00 – 4.50	Glacial Till
BH206	6.95	2.00 – 6.00	Glacial Till
BH301	9.00	3.00-9.00	Chester Pebble Beds (Sherwood Sandstone)
BH302	9.00	3.00-9.00	Glacial Till/Chester Pebble Beds (Sherwood Sandstone)

- 2.2.3 The annulus between the monitoring well and the borehole was filled with a pea gravel filter. The top of the borehole was sealed from the surface with a bentonite 'plug' and the top of the standpipe was fitted with a gas tap and lockable flush mounted well cover.

- 2.2.4 The above configuration was selected to allow the characterisation of the ground gas regime in the natural deposits and allow sampling for the assessment of groundwater quality.

2.3 Soil Sampling

- 2.3.1 Soil samples comprising disturbed (glass jar, tub and bulk bag) and undisturbed samples were collected from the exploratory holes at distinct changes in lithology and across a range of depths/strata across the site in order to be tested for a range of chemical parameters, as well as any soils exhibiting palpable visual and/or olfactory signs of contamination.
- 2.3.2 Soil samples were selected for laboratory analysis by a Capita engineer based on a review of the site findings and logs.
- 2.3.3 Samples selected for chemical analysis were transferred to laboratory prepared glass jars and/or plastic tubs and stored in pre-chilled cool boxes prior to dispatch to the laboratory.

2.4 Geotechnical Testing

- 2.4.1 25no soil samples were submitted for geotechnical laboratory analysis at PSL, Doncaster.
- 2.4.2 In order to obtain geotechnical parameters for the proposed development soil samples were tested for one or more of the following:
- Moisture Content;
 - Atterburg Limits; and
 - Particle Size Distribution.
- 2.4.3 The results of the geotechnical testing are presented in the PSL report in Appendix C.

2.5 Chemical Testing

- 2.5.1 In order to quantify the level of contamination at the site, 64no soil samples were selected for laboratory analysis at SAL, Manchester.
- 2.5.2 The samples were tested for one or more of the following:
- Metals and Semi Metals: As, Cd, Cr, Cu, Ni, Pb, Hg, Se, and Zn;
 - Non-metallic Inorganics: pH and water soluble sulphate (SO₄);
 - Poly Aromatic Hydrocarbons (PAHs – 16no);
 - Total Petroleum Hydrocarbons;
 - Poly-Chlorinated-Biphenyl's (PCB EC7 and PCBWHO12);
 - Volatile Organic Compounds (USEPA 624); and
 - Asbestos.
- 2.5.3 The results of the chemical testing are presented in the SAL Reports in Appendix D.

2.6 Gas and Groundwater Monitoring

- 2.6.1 Gas and groundwater monitoring wells were installed in boreholes BH201-BH206 and BH301-302.
- 2.6.2 In order to fully characterise the ground gas regime at the site in line with development proposals and current industry guidance (CIRIA C665), a programme of 6no visits over 3no months was completed between 28th October 2016 and 10th January 2017.
- 2.6.3 An additional 2no visits were carried out during February 2017.
- 2.6.4 A dual phase interface probe was used to dip all wells however no NAPL was encountered.
- 2.6.5 The results of the gas and groundwater monitoring undertaken are presented in Appendix F and a gas risk assessment is provided in Section 7.

3. Ground Conditions

3.1 Stratigraphy

- 3.1.1 The ground conditions encountered during the intrusive investigation largely confirmed the anticipated geology and in general comprised Made Ground deposits overlying Glacial Till which overlies solid Sandstone strata of the Chester Pebble Beds Formation of the Sherwood Sandstone Group.
- 3.1.2 The following table summarises the current findings:

Lithology	Depths to base of unit (mbgl)	Thickness Range (m)
Made Ground	0.40-4.00	0.40-4.00
Glacial Till Deposits	1.60-6.45	0.10-4.65
Chester Pebble Beds	>6.95	Not Proven

- 3.1.3 Made Ground deposits were encountered (G.L to 4.00m) overlying Glacial Till deposits comprising clay (from 0.40m to 6.45mbgl). The basal stratum encountered during the ground investigation was Sandstone of the Chester Pebble Beds Formation of the Sherwood Sandstone Group (proven to 6.95mbgl).

3.2 Made Ground

- 3.2.1 Made Ground comprised both granular and cohesive material and was encountered in all of the exploratory holes. The Made Ground was variable comprising silty SAND, silty gravelly SAND, clayey sandy GRAVEL, silty sandy GRAVEL, sandy gravelly COBBLES, slightly sandy slightly gravelly CLAY, sandy slightly gravelly CLAY and slightly sandy gravelly CLAY. Gravel typically comprised fragments of brick, metal, concrete, Victorian concrete, sandstone, mudstone, siltstone, coal, clinker, slag, coal, plastic, timber, glass, ceramic and slate. Frequent cobbles were recorded across the subject site, and generally consisted of brick, concrete, Victorian concrete and sandstone.
- 3.2.2 In-situ penetration testing within the Made Ground gave N-values of between 4 and 14 indicating the variable nature of the materials and significant quantities of oversize material including cobbles and boulders.
- 3.2.3 Geotechnical classification tests undertaken on 3no samples of cohesive Made Ground at a depth of 1.00m indicated the following:

Test	Range of Values
Natural Moisture Content	20-39%
Liquid Limit	33-62%
Plastic Limit (%)	15%-30%

Plasticity Index (%)	18-32%
Fraction <0.425mm (%)	84-97%
Modified Plasticity Index (%)	17-31%

- 3.2.4 The classification test results generally indicate these cohesive samples of Made Ground comprise slightly sandy slightly gravelly CLAY and sandy slightly gravelly CLAY, with a modified plasticity index ranging from 17-31% and therefore a low to medium shrinkage/swell potential.
- 3.2.5 Geotechnical classification tests undertaken on 6no samples of Granular Made Ground between depths 0.10m and 0.60mbgl indicated that soils consist of clayey/silty sandy GRAVEL with a high cobble content, slightly clayey/silty very gravelly COBBLES, clayey/silty very sandy GRAVEL with a low cobble content, clayey/silty sandy GRAVEL and COBBLES.

3.3 Glacial Till Deposits

- 3.3.1 Glacial Till deposits were encountered in a number of exploratory holes which bottomed out the Made Ground at depths of between 0.40m and 2.20mbgl.
- 3.3.2 Glacial Till deposits comprised both cohesive and granular strata. Cohesive Till deposits comprised firm to very stiff brown mottled grey slightly sandy slightly gravelly CLAY, firm silty CLAY and stiff sandy slightly gravelly CLAY. Granular strata was encountered within a single locality and comprised silty SAND & GRAVEL. Cobbles were noted at various locations around the subject site, within cohesive Glacial Till deposits.
- 3.3.3 In-situ penetration testing within the Glacial Till deposits gave N-values ranging from 6 to 20, highlighting the variability of the soils. However an increase in strength with depth can be observed within the data set.
- 3.3.4 Geotechnical classification tests undertaken on 3no samples of granular natural deposits at a depth of between 2.00mbgl and 2.20mbgl indicated that soils consist of clayey/silty very sandy GRAVEL, clayey/silty slightly gravelly SAND and clayey/silty SAND.
- 3.3.5 Geotechnical classification tests undertaken on 11no samples of cohesive Glacial Till deposits between depths 0.50m and 6.00mbgl indicated the following:

Test	Range of Values
Natural Moisture Content	11 – 24%
Liquid Limit	27 – 40%
Plastic Limit (%)	13 – 20%
Plasticity Index (%)	12 – 28%
Fraction <0.425mm (%)	94 – 98%
Modified Plasticity Index (%)	12 – 27%

- 3.3.6 The classification test results generally indicate the slightly sandy slightly gravelly CLAY and sandy slightly gravelly CLAY to be of low to intermediate plasticity. The material has a modified plasticity index range of 12% to 27% and thus has a low to medium shrinkage/swell potential.

3.4 Sherwood Sandstone Group

- 3.4.1 Bedrock of Chester Pebble Beds Formation was encountered within all exploratory boreholes and a number of trial pit locations primarily to the west of the subject site. The stratum appears to lie at greater depths to the east of the site. Bedrock was found to underlie Made Ground and Glacial Till deposits at depths of between 1.60m and 6.45mbgl. The strata comprised very weak to medium strength weathered reddish brown Sandstone. The uppermost weathered deposits were recovered as reddish brown silty fine to coarse SAND.
- 3.4.2 All boreholes were terminated with SPT N-Value refusals of greater than 50 within the sandstone bedrock.

3.5 Observations

- 3.5.1 A significant amount of palpable visual and olfactory evidence of hydrocarbon contamination was noted across the subject site, and was recorded by the Capita engineer as diesel, phenol and hydrocarbon odours. The impact was primarily located along the north western boundary along Bowes Street, Princess Parkway to the west of the site and to the southeast of the site in close proximity to Laurel Avenue. The impact was noted within granular and cohesive Made Ground deposits, Granular Glacial Till and within the underlying bedrock of the Chester Pebble Beds.
- 3.5.2 A significant number of site wide exploratory holes identified cobble sized material within the Made Ground. This indicates that potentially significant quantities of oversize material including cobbles and boulders remain following the demolition of the former Bus Depot which once occupied the site.

3.6 Groundwater

- 3.6.1 Groundwater entries were recorded during exploratory hole formation at depths of between 0.35-3.00mbgl. The majority of the groundwater seepages/strikes were recorded within Made Ground and are not thought to be representative of the true groundwater level, but are perched waters within Made Ground deposits, predominantly sitting atop impermeable cohesive Glacial Till deposits. During subsequent monitoring, rest water levels were recorded in the standpipes at depths of between 0.62 and 2.45mbgl.
- 3.6.2 The rest groundwater levels in BH301 and BH302 between 3.62-4.66mbgl are considered to be representative of the true groundwater within the bedrock aquifer beneath the site.
- 3.6.3 It should be appreciated that ground and groundwater conditions may vary between and away from the exploratory hole positions, and that no account can be taken in this report of such variations.

- 3.6.4 It should also be noted that groundwater levels may be affected by seasonal variations such as rainfall and that no account can be taken of such variations in this report due to the short monitoring period.

4. Geotechnical Appraisal

4.1 Proposed Development

- 4.1.1 The site is being considered for redevelopment to comprise an Extra Care unit on the western area of the site fronting Princess Road with residential apartments and houses across the remainder of the site with associated access roads, car parking and landscaping. A proposed development plan is included in Appendix A.

4.2 Ground Conditions

- 4.2.1 The ground conditions encountered during the intrusive investigation largely confirmed the anticipated geology and in general comprised Made Ground deposits overlying Glacial Till deposits which overly solid Sandstone strata of the Chester Pebble Beds Formation of the Sherwood Sandstone Group.
- 4.2.2 Made Ground comprised both granular and cohesive material and was encountered in all of the exploratory holes. The Made Ground was variable comprising silty SAND, silty gravelly SAND, clayey sandy GRAVEL, silty sandy GRAVEL, sandy gravelly COBBLES, slightly sandy slightly gravelly CLAY, sandy slightly gravelly CLAY and slightly sandy gravelly CLAY. Gravel typically comprised fragments of brick, metal, concrete, Victorian concrete, sandstone, mudstone, siltstone, coal, clinker, slag, coal, plastic, timber, glass, ceramic and slate. Frequent cobbles were recorded across the subject site, and generally consisted of brick, concrete, Victorian concrete and sandstone.
- 4.2.3 Glacial Till deposits comprised both cohesive and granular strata. Cohesive Till deposits comprised firm to very stiff brown mottled grey slightly sandy slightly gravelly CLAY, firm silty CLAY and stiff sandy slightly gravelly CLAY. Granular strata was encountered within a single locality and comprised silty SAND & GRAVEL. Cobbles were noted at various locations around the subject site, within cohesive Glacial Till deposits.
- 4.2.4 In-situ penetration testing within the Glacial Till deposits gave N-values ranging from 6 to 20, highlighting the variability of the soils. However an increase in strength with depth can be observed within the data set.
- 4.2.5 Bedrock of Chester Pebble Beds Formation was encountered within all exploratory boreholes and a number of trial pit locations primarily to the west of the subject site. Bedrock was found to underlie Made Ground and Glacial Till deposits at depths of between 1.60m and 6.45mbgl. The strata comprised very weak to medium strength weathered reddish brown Sandstone. The uppermost weathered deposits were recovered as reddish brown silty fine to coarse SAND.
- 4.2.6 All boreholes were terminated with SPT N-Value refusals of greater than 50 within the sandstone bedrock.

4.3 Site Preparation

- 4.3.1 The site is currently un-occupied following the demolition of the former Bus Depot and the subsequent remedial works.
- 4.3.2 General turnover of the uppermost Made Ground will therefore be required locally (i.e. beneath the footprints of new buildings and along service routes) to allow the breaking out and removal of any potential remaining former sub-structures including brick and concrete foundations and historical features. Concrete and masonry should be crushed to a suitable grading (e.g. 6F2) for re-use in the development (e.g. working platforms, road capping, temporary haulage roads etc.).
- 4.3.3 Where any remaining structures are particularly deep (e.g. old piles), total removal will not be practical or economical and therefore the positions of such obstructions should be accurately recorded to allow new foundations to be designed around them accordingly.
- 4.3.4 Sorting and screening to remove deleterious materials and crushing of oversized items (concrete blocks, blocks of masonry, etc.) should be undertaken where necessary in order to facilitate and improve the compaction of site-won fill materials during placement. This process may generate a fraction which will not be suitable for re-use (including potentially deleterious materials such as timber) and as such these are likely to require offsite disposal.
- 4.3.5 Granular materials should be used preferentially in areas beneath proposed structures. The use of cohesive materials should therefore be considered more appropriate as general fill (in landscape areas for example) where settlements are less critical.

4.4 Foundations & Floor Slabs

- 4.4.1 Given the variable thickness of the Made Ground deposits and the competence of the natural strata across the site, a combination of foundation solutions should be considered for the subject site. In areas of Made Ground less than 1.80mbgl, shallow spread foundations may be considered as a suitable founding option. According to the SPT 'N' values observed at the subject site, the suitable founding strata will be firm to very stiff clay or shallow weathered sandstone bedrock of the Chester Pebble Beds. The uppermost cohesive Glacial Till deposits can be conservatively expected to provide a bearing capacity ranging from 80-150kN/m² depending on the stiffness of the strata.
- 4.4.2 The depth to competent founding strata across the site varies significantly. An indicative foundation depth zoning plan is presented in Appendix A.
- 4.4.3 Based on the varying, and in places considerable, thickness of Made Ground deposits across the site, suspended floor slabs are recommended to restrict differential settlements.
- 4.4.4 In areas where the depth to an appropriate bearing stratum is greater than 1.80mbgl, a piled foundation solution will be required to transfer structural loads through the variable Made Ground deposits to the bedrock or competent cohesive Glacial Till at depth.

- 4.4.5 A bored, cast in-situ pile type will likely be the most appropriate solution allowing penetration through and beyond any residual obstructions in the Made Ground. Piles will likely be required to transmit structural loads to sandstone or competent cohesive glacial till at depths of around 2.00 to 4.00mbgl.
- 4.4.6 Any piling works should adhere to the EA guidance on piling through contaminated soils, so as to prevent any mobilisation of contamination into underlying natural soils or the Principal Bedrock Aquifer. Furthermore piling may create migration pathways for hazardous ground gases, which have been identified at the subject site.
- 4.4.7 Detailed pile designs (in terms of pile type, depths, and method of installation) would be dependent upon the required working loads and should be undertaken in conjunction with a reputable, specialist, piling contractor; ideally with local experience.
- 4.4.8 Ground improvement techniques may be viable at the subject site through the use of vibro-stone/concrete columns, ideally where the underlying competent strata is granular weathered sandstone bedrock. The subsequent foundations should be 'rafted strips'.

4.5 Pavement and Road Design

- 4.5.1 In consideration of the ground conditions encountered, it is likely that the pavement subgrade exposed at formation levels will comprise predominantly cohesive Glacial Till or variable Made Ground deposits.
- 4.5.2 Pavement and road design should be based upon a suitable (equilibrium) CBR value for such formation soils. Reference has been made to Table 5.1 'Equilibrium Subgrade CBR Estimation' in IAN 73/06 (Highways Agency, 2009) and from this it is recommended that new road pavement and road construction design should be based upon (an estimated) CBR value of about 3-5%.
- 4.5.3 However, the design value will need to be reviewed and confirmed by suitable in-situ testing at formation levels following earthwork operations and prior to pavement construction.
- 4.5.4 Notwithstanding this, the formation at all levels should be proof-rolled prior to pavement construction, and any soft zones thus revealed should be excavated out, with the resulting excavation in-filled with appropriately graded engineered granular fill.

4.6 Concrete Classification

- 4.6.1 Design/mix of buried concrete should be undertaken in accordance with the BRE Special Digest 1 (2005).
- 4.6.2 A summary of the soil and groundwater chemical results pertinent to concrete classification is presented in the following table.

Matrix	Test	Range of Values
Soil	pH	5.40 – 11.20
	Sulphate (water sol 2:1) (mg/l)	100 - 500

- 4.6.3 A review of the soil chemical results indicates that sulphate and pH results fall within “Design Sulphate Class” DS-2, and the “Aggressive Chemical Environment for Concrete” (ACEC) class for the site is considered to be AC-1s. Design/mix of buried concrete should be undertaken in accordance with these classifications.

4.7 Excavations and Groundwater

- 4.7.1 Excavations at the site should be feasible using an appropriate scale of hydraulic plant. All excavations at the site will require adequate lateral support, or battering back to a safe angle, to ensure their stability.
- 4.7.2 Based on the available data, it is considered likely that perched groundwater will be encountered in shallow excavations (i.e. <2.0mbgl) at the site, especially during periods of wet weather and in this scenario appropriate groundwater control/dewatering provisions should be employed to keep such excavations dry.

5. Contamination Assessment

5.1 Introduction

- 5.1.1 In line with CLR11 (DEFRA & EA, 2004), a Generic Quantitative Risk Assessment (GQRA) has been undertaken to determine the significance of the measured concentrations of contaminants from the chemical analysis.
- 5.1.2 The GQRA comprises the comparison of the measured concentrations with Assessment Criteria (AC) which comprise "Suitable 4 Use Levels" (S4UL's) as published by LQM/CIEH (Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3296. All rights reserved). Where no S4UL has been published, the preceding Generic Assessment Criteria values derived using the CLEA model adopting the appropriate assumptions and input parameters provided in the SR series of reports have been used.
- 5.1.3 S4UL's have been derived in line with developments in UK human health risk assessment since 2009, in particular the additional land uses and exposure assumptions presented in Defra's recent C4SL guidance. However, the S4ULs are all based on Health Criteria that represent minimal or tolerable levels of risks to health as described in the Environment Agency's SR2 guidance, ensuring that the resulting assessment criteria are 'suitable for use' under planning.
- 5.1.4 The proposed end-use for the site comprises the development of a low rise residential development. We have therefore undertaken a GQRA on the basis that the proposed development site falls under the "Residential with Plant Uptake" land-use scenario as defined in SR3.
- 5.1.5 With reference to Environment Agency GP3 2013, appropriate "compliance points" for Hazardous and Non-hazardous substances are considered to be 50m and 250m from the source respectively. At this stage (Tier 1 Risk Assessment) it is conservatively assumed that the source is at the target receptor (i.e. contamination attenuation due to degradation, dispersion and dissolution are zero) and the ACs for groundwater concentrations comprise environmental quality standards protective of the principal aquifer beneath the site.
- 5.1.6 The relevant statistical tests have been undertaken where appropriate in accordance with guidance provided in CIEH & CL:AIRE (2008).
- 5.1.7 In deriving the ACs for use on Brownfield sites we have assumed a "Sandy Soil" with 1% Soil Organic Matter.
- 5.1.8 The tables in Appendix E present the results of the GQRA and a summary of the findings is provided below.

5.2 Soil Analysis

- 5.2.1 36no soil samples obtained from both Made Ground and Natural soils have been analysed for potential contaminants of concern and where relevant assessed against the "Residential with Plant Uptake" AC.

- 5.2.2 pH was recorded between 5.40 and 11.20 which is representative of slightly acidic to alkaline conditions.
- 5.2.3 36no samples were tested for one or more of the following suites of determinands:
- Metals and Semi Metals: As, Cd, Cr, Cu, Ni, Pb, Hg, Se, and Zn;
 - Non-metallic Inorganics: pH and water soluble sulphate (SO₄);
 - Poly Aromatic Hydrocarbons (PAHs – 16no);
 - Total Petroleum Hydrocarbons;
 - Volatile Organic Compounds (VOCs);
 - Asbestos ID; and
 - Poly-Chlorinated Biphenyl's (PCB's).
- 5.2.4 The majority of the concentrations of metals passed their defined AC, however samples collected from TP220 (1.00mbgl), TP221 (0.30mbgl), TP225 (1.00mbgl), TP229 (1.10mbgl) failed the respective AC for determinands which include Arsenic, Lead and Copper; however the 95th percentile concentrations for all were below their respective AC.
- 5.2.5 All of the concentrations of total cyanide were recorded below the defined AC.
- 5.2.6 27no samples were screened for asbestos fibres. No positive asbestos identifications were made during testing.
- 5.2.7 27no samples were analysed for TPHCWG. The majority of contaminant concentrations were recorded below their respective AC with the exception of 6no samples obtained from TP214 (2.10mbgl & 4.20mbgl), TP216 (0.60mbgl), TP218 (0.70mbgl), TP220 (1.00mbgl) and TP229 (1.10mbgl) exceeding their respective AC for TPH fractions Aliphatic C8-C10, Aromatic C8-C10, C12-16 and C16-21; however the 95th percentile concentrations for the majority were below their respective AC. The TPH fraction for both Aliphatic C8-C10 and Aromatic C8-C10 95th percentile concentration was above the respective AC.
- 5.2.8 36no samples were analysed for PAHs. The majority of contaminant concentrations were recorded below their respective AC however 12no samples recorded contaminant concentrations above their respective AC within TP204 (0.80mbgl), TP214 (4.20mbgl), TP215 (0.70mbgl), TP216 (0.60mbgl), TP218 (0.70mbgl), TP220 (1.00mbgl), TP221 (0.30mbgl), TP224 (0.40mbgl), TP225 (1.00mbgl), TP229 (0.35mbgl and 1.10mbgl), BH203 (1.20mbgl), BH204 (0.30mbgl) and BH206 (1.40mbgl) exceeding their respective AC for various PAH species including Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Chrysene, Naphthalene, Indeno(123-cd)pyrene and Dibenz[ah]anthracene. The 95th percentile concentrations for Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Chrysene, Naphthalene and Dibenz[ah]anthracene exceed their respective AC. A significant Naphthalene exceedance was recorded in TP125 (0.6mbgl) with a concentration of 26mg/kg, compared to an AC of 2.3mg/kg.
- 5.2.9 4no samples were analysed for VOCs. A single significant Naphthalene exceedance was recorded within BH206 (1.40mbgl) with a concentration of 26mg/kg, compared to an AC of 5.5mg/kg.

- 5.2.10 2no samples obtained from locations in proximity to the substation along Bowes Street were analysed for PCB EC7 and PCB WHO12 congeners. The recorded concentrations were below the level of detection.

5.3 Groundwater Risk Assessment

- 5.3.1 Groundwater testing was undertaken during the previous Curtins Phase 2 Intrusive Investigation. Elevated concentrations of hydrocarbons were indicated in all of the water samples, including samples originating from the bedrock aquifer.
- 5.3.2 Following demolition a further groundwater monitoring programme was carried out. 5no new boreholes were sampled on 4no separate occasions during the remediation works contract in 2012. Testing of a wide range of determinands appeared to demonstrate contamination was decreasing to within acceptable levels.
- 5.3.3 The ground conditions encountered during the current intrusive investigation largely confirmed the anticipated geology and, in general, comprised Made Ground deposits overlying Secondary Undifferentiated Glacial Till deposits which overly the Principal Aquifer of solid Sandstone strata of the Chester Pebble Beds Formation.
- 5.3.4 A significant amount of palpable visual and olfactory evidence of hydrocarbon contamination was noted across the subject site, and was recorded by the capita engineer as diesel, phenol and hydrocarbon odours. The impact was primarily located along the north western boundary along Bowes Street, Princess Parkway to the west of the site and to the southeast of the site located in close proximity to Laurel Avenue. The impact was noted within granular and cohesive Made Ground deposits, groundwater seepages, granular Glacial Till and within the underlying bedrock of the Chester Pebble Beds.
- 5.3.5 A number of TPH CWG exceedances for TPH fractions Aliphatic C8-C10, Aromatic C8-C10, C12-16 and C16-21 were recorded across the subject site. These TPH fractions are characteristic of diesel contamination which is consistent with the sites history and with previous investigations undertaken at the site.
- 5.3.6 The exceedances recorded within TP214 (4.20mbgl) are within the weathered deposits of the Chester Pebble Beds Formation, a Principal Aquifer.
- 5.3.7 Following the initial phase of Capita investigation 3no samples of groundwater were obtained from boreholes, with a suitable quantity of groundwater at the time of sampling. The samples were analysed for metals and semi-metals, cyanide, TPH CWG and PAHs. All of the contaminants were screened against the respective AC for a Principal Aquifer, and all samples exceeded contamination thresholds for PAH species including Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(ghi)perylene, Benzo(a)pyrene, and Indeno(123-cd)pyrene. The samples did not however record elevated hydrocarbon concentrations.
- 5.3.8 While installations were emplaced within the shallow weathered deposits of the Principal Aquifer, recorded contaminants are consistent with elevated PAH's observed within Made Ground soils, and could have arisen from shallow ground water seepages, or in fact may be representative of the groundwater quality of the underlying Principal Aquifer.

- 5.3.9 During the subsequent phase of Capita intrusive investigation 2no rotary boreholes were installed with monitoring wells targeting the natural strata. The results of chemical analysis on these samples are discussed in Section 6.

5.4 Conclusion

- 5.4.1 Sampling and testing of the site soils has been undertaken to quantify the level of contamination that could potentially be exposed at the surface in the proposed development.
- 5.4.2 Elevated contaminants within site soils include metals, TPH and PAH. This appears indicative of general site wide contamination which is not unexpected considering the sites historic use, although some “non-contaminated” areas do exist within the footprint of the site. Much of the underlying natural Glacial Till is “non-contaminated” and the majority of exceedances are recorded within perched waters within Made Ground deposits which sit atop the Glacial Till deposits.
- 5.4.3 The driving exposure pathways for the majority of these contaminants comprise direct exposure pathways including soil ingestion/inhalation and dermal contact. Therefore, in areas with buildings/external hard-standing or similar, no such potential pollution linkage would exist, and hence no specific remedial measures would be required. However in the areas of landscaping and private garden areas the potential contamination linkage will need to be broken by capping with a suitable thickness (600mm) of uncontaminated cover soils. In general landscaping areas this thickness could likely be reduced to 300mm. Clean cover soils in landscaped areas will also prevent new planting from being affected by phytotoxic conditions.
- 5.4.4 Elevated levels of Naphthalene have been encountered within 7no samples (TP214, TP220, TP224, TP225, TP229, BH203 and BH206). Naphthalene can present a risk through inhalation of volatile vapour; delineation has been undertaken in these areas which is described in Section 6. The hotspots could be left in-situ; however hydrocarbon resistant membranes would be required for all properties within the affected areas.
- 5.4.5 Delineation of the diesel impact has been undertaken to ascertain the risk to the underlying Principal Aquifer of the Chester Pebble Beds; this is described in Section 6. Furthermore Hydrocarbon fractions less than C12 have been recorded at the subject site and can present a risk through inhalation of volatile vapour, as per the above, from a human health point of view, the hotspots could be left in-situ, however hydrocarbon resistant membranes would be required for all properties within the affected areas.
- 5.4.6 The site Made Ground soils contain phytotoxic (*poisonous to plants*) elements of copper and zinc at concentrations which exceed the thresholds set out in the relevant British Standards for topsoil and subsoil. There is no useable volume of topsoil on the site; therefore an allowance will need to be made for the import of clean topsoil/subsoil to support plant growth in new soft landscaped areas.

6. Further Delineation Investigations

6.1 Introduction

- 6.1.1 During the subsequent phase of Capita intrusive investigation 2no rotary boreholes were installed with monitoring wells targeting the natural strata. Groundwater samples considered representative of the true groundwater at the site were collected and submitted for chemical analysis.
- 6.1.2 Additionally, following the main bulk of intrusive investigations and upon receipt of all chemical analysis certificates, delineation investigations were undertaken around areas of identified volatile contamination.
- 6.1.3 Shallow trial pits were formed around initial contamination exceedances including naphthalene and light-end volatile hydrocarbons which would require removal or the inclusion of hydrocarbon resistant membranes to proposed buildings.
- 6.1.4 For all further investigation detailed below the exploratory hole positions are shown in Appendix A, corresponding exploratory hole logs are presented in Appendix B, chemical laboratory reports are included within Appendix D and comparison with assessment criteria is presented in Appendix E.
- 6.1.5 An indicative contamination zoning plan highlighting the area of contamination which has been delineated is presented in Appendix A.

6.2 Groundwater Analysis

- 6.2.1 The 2no rotary boreholes were installed with monitoring wells targeting the natural strata. These installations screened off the shallow Made Ground deposits and the rest water levels were recorded at depths of between 3.62 and 4.66mbgl, which is considered representative of the true groundwater level within the underlying Principal Aquifer.
- 6.2.2 Groundwater samples were collected from each of the installations and were analysed for metals and semi-metals, cyanide, TPH CWG and PAHs. All of the contaminants were screened against the respective AC for a Principal Aquifer.
- 6.2.3 The majority of contaminant concentrations were recorded below the respective AC. However the sample from BH301 recorded elevated Nickel (88µg/l compared to the AC of 20µg/l) and marginally elevated Benzo(b)fluoranthene (0.12µg/l compared to 0.1µg/l) and Benzo(a)pyrene (0.12µg/l compared to 0.01µg/l). Elevated heavy-end hydrocarbons were also recorded with concentrations of Aliphatic C21-35 at 410µg/l compared to the World Health Organisation (WHO) criteria of 300µg/l; and Aromatic C12-16 and C16-21 at 240µg/l and 530µg/l respectively compared to WHO criteria of 100µg/l and 90µg/l.
- 6.2.4 The sample obtained from BH302 recorded only one marginal exceedance of Benzo(a)pyrene at 0.04µg/l compared to the AC of 0.01µg/l. The sample did not record any elevated hydrocarbon concentrations.

- 6.2.5 The installation within BH301 screened off the Made Ground deposits leaving the response zone within the underlying Sherwood Sandstone. The recorded groundwater contamination corresponds with a hydrocarbon hotspot area which comprises diesel contamination within the uppermost weathered Sherwood Sandstone. The elevated groundwater contaminants may therefore be representative of the true groundwater quality beneath this area of the site. Capita obtained an additional groundwater sample from this borehole to determine whether the contamination at this location is showing signs of decreasing.
- 6.2.6 Within the additional sample obtained from BH301 the majority of contaminant concentrations were recorded below the respective AC. However the sample did record elevated Arsenic (20µg/l compared to the AC of 10µg/l), Nickel (66µg/l compared to the AC of 20µg/l) and a marginal Benzo(a)pyrene exceedance (0.02µg/l compared to 0.01µg/l). Elevated heavy-end hydrocarbons were also recorded with concentrations of C16-21 at 570µg/l respectively compared to WHO criteria of 90µg/l.
- 6.2.7 The additional sample has identified a reduction in the concentration of Nickel and Benzo(b)fluoranthene, however an additional exceedance of Arsenic has been recorded, and the heavy end hydrocarbon fraction of Aromatic C16-C21 has increased. Thus the elevated contaminant concentrations within the hydrocarbon hotspot area is deemed representative of the true groundwater beneath this area of the subject site. Remedial action is therefore likely to be required to nullify the diesel contamination within the uppermost weathered Sherwood Sandstone.

6.3 Soil Analysis

- 6.3.1 28no soil samples obtained from both Made Ground and Natural soils from the delineation trial pits have been analysed for PAHs and Total Petroleum Hydrocarbons, and where relevant assessed against the "Residential with Plant Uptake" AC.
- 6.3.2 28no samples were analysed for TPHCWG. The majority of contaminant concentrations were recorded below their respective AC with the exception of 7no samples obtained from TP301 (1.30mbgl), TP303 (0.50mbgl), TP304 (1.00mbgl), TP306 (0.70mbgl), TP308 (0.60mbgl), TP315 (0.8mbgl) and TP316 (0.70mbgl) exceeding their respective AC for TPH fractions including Aromatic C12-16, C16-21 and C21-35; however the 95th percentile concentrations for the majority were below their respective AC. The TPH fraction for Aromatic C16-21 95th percentile concentration was above the respective AC.

- 6.3.3 28no samples were analysed for PAHs. 13no samples recorded contaminant concentrations above their respective AC within TP301 (1.30mbgl), TP302 (1.40mbgl), TP303 (0.50mbgl), TP304 (1.00mbgl), TP306 (0.70mbgl), TP307 (0.80mbgl), TP308 (0.60mbgl), TP311 (0.70mbgl), TP312 (1.80mbgl), TP316 (0.70mbgl), TP319 (1.40mbgl), TP323 (0.50mbgl) and TP325 (1.00mbgl) exceeding their respective AC for various PAH species including Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz[ah]anthracene, Fluoranthene, Indeno(123-cd)pyrene and Naphthalene. The 95th percentile concentrations for Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Chrysene, Dibenz[ah]anthracene and Naphthalene exceed their respective AC. Significant Naphthalene exceedances were recorded in TP302 (1.4mbgl), TP303 (0.5mbgl), TP304 (1.00mbgl) and TP306 (0.70mbgl) with concentration of 120mg/kg, 73mg/kg, 22mg/kg and 57mg/kg respectively compared to an AC of 2.3mg/kg. Further marginal Naphthalene exceedances were recorded in TP311 (0.70mbgl) and TP316 (0.70mbgl) with concentrations of 8.5 and 3.2mg/kg.
- 6.3.4 28no samples were also tested for BTEX, a group of volatile organic compounds found in petroleum hydrocarbons. Exceedances of one or more of the compounds including Benzene, Ethylbenzene and xylenes were recorded in samples from TP302 (1.40mbgl), TP303 (0.5mbgl), TP304 (1.00mbgl), TP306 (0.70mbgl), TP310 (2.1mbgl), TP315 (0.8mbgl), TP316 (0.70mbgl) and TP321 (1.00mbgl).

6.4 Conclusion

- 6.4.1 An indicative contamination zoning plan highlighting the delineated area of contamination is presented in Appendix A.
- 6.4.2 The majority of the recorded contamination is within the shallow Made Ground deposits. The single exception to this is at the location of TP214 where elevated hydrocarbons were recorded within the uppermost weathered Sherwood Sandstone at a depth of 4.20mbgl.
- 6.4.3 Across the majority of the site the contaminated Made Ground soils are underlain by cohesive Glacial strata which will effectively sever the migration pathway to the underlying bedrock aquifer. In this situation the hotspots could be left in-situ; however hydrocarbon resistant membranes would be required for all properties within the affected areas. Areas of hardstanding and landscape capping would remove the remaining direct contact pathway between the contamination and the site end-user.
- 6.4.4 Alternatively the impacted Made Ground soils could be excavated and removed from site; eliminating the need for a hydrocarbon resistant membrane within new structures (a gas membrane may still be required, see Section 7).
- 6.4.5 In the location of TP214, impacted Made Ground soils immediately overlie strata of the Sherwood Sandstone. In this area, samples from the uppermost weathered Sandstone also contained elevated hydrocarbon concentrations. Groundwater samples collected from BH301 confirms that the contamination in this area is negatively impacting the underlying groundwater, and thus it may be necessary to remediate the uppermost weathered sandstone, possibly by excavation and removal of all impacted material in the vicinity or by soil stabilisation methods.

7. Ground Gas Assessment

7.1 Methodology

- 7.1.1 Current guidance for the assessment of risk associated with the presence of hazardous ground gases (principally methane and carbon dioxide within ground gas) is provided in two key documents:
- Code of practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings. British Standard Institution (BS 8485: 2015); and
 - Assessing Risks posed by Hazardous Ground Gases to Buildings CIRIA (C665, 2007).
- 7.1.2 The assessment presented herein is primarily based on the British Standard document.
- 7.1.3 Hazardous ground gases can be considered as a type of land contamination, and qualitative risk assessment is based on a conceptual model similar to that used for soil and groundwater contamination sources (i.e., source-pathway-receptor pollutant linkages). A semi-quantitative estimate of risk can be provided, based upon the qualitative risk model and gas monitoring results.
- 7.1.4 Based on the measured flow rates and measured hazardous gas concentrations, individual “hazardous gas flow rates” (Q_{hg}) can be derived for each monitoring point, from which the “site characteristic hazardous gas flow rate” (Q_{hgs}), and then the “Characteristic Situation” can be determined.
- 7.1.5 BS8485 provides guidance on the level of required gas protection based upon the characteristic situation and the type of development (e.g. non-managed property such as private housing, public buildings, commercial buildings or industrial buildings).

7.2 Ground Gas Conceptual Model

- 7.2.1 The proposed development comprises residential properties, Type A Buildings. As such the sensitivity of the development has been deemed to be “High”.
- 7.2.2 On-site potential sources of ground gas generation have been identified on the basis of the desk study information. These comprise:
- Made Ground deposits which may give rise to the generation of hazardous ground gas; nevertheless the generation potential associated with Made Ground deposits is considered to be Low.
- 7.2.3 The overall risk is therefore considered “Moderate” and a programme of gas monitoring, comprising 6no visits over a period of 3 months, has been completed to quantify the ground gas regime and allow a risk assessment to be completed.

7.3 Recorded Ground Gas Regime

- 7.3.1 Standpipes installed during the intrusive works have been monitored on 6no occasions, between the 27th October 2016 and the 10th January 2017. A further 2no additional gas monitoring visits were carried out on 13th and 20th February 2017.
- 7.3.2 The gas monitoring data is presented in Appendix F.
- 7.3.3 The data collected have been compiled to complete a gas risk assessment for the site. A summary of the results together with the calculated hazardous gas flow rates is presented in the following table:

Monitoring Well	Max Flow (l/hr)	Max CH ₄ (%v/v)	Max CO ₂ (%v/v)	Max CH ₄ Q _{hg} (l/hr)	Max CO ₂ Q _{hg} (l/hr)	Characteristic Situation
BH201	<0.1	<0.1	3.8	0.0001	0.0038	1
BH202	0.2	21.3	0.6	0.0426	0.0012	2
BH203	21.5	0.7	<0.1	0.1505	0.0215	2
BH204	<0.1	<0.1	<0.1	0.0001	0.0001	1
BH205	20.5	<0.1	<0.1	0.0205	0.0205	1
BH206	15.0	<0.1	<0.1	0.0150	0.0150	1
BH301	<0.1	2.3	1.8	0.0023	0.0018	2
BH302	32.2	<0.1	5.8	0.0322	1.8676	3

Note: Where flow <0.1l/r and/or gas concentration <0.1% were recorded, a value of 0.1 has been assumed to calculate the Q_{hg}.

7.4 Assessment and Recommendations

- 7.4.1 The table below is reproduced from BS8485 and presents the relationship between thresholds in the monitoring data and “Characteristic Situations”.

Characteristic Situations

Characteristic Situation	Hazard Potential	Q _{hgs} (l/hr)	Additional Factors
1	Very Low	<0.07	Typically ≤1% CH ₄ and ≤5%CO ₂
2	Low	≥0.07, <0.7	Typical measured flow rate <70l/h
3	Moderate	≥0.7, <3.5	
4	Moderate to High	≥3.5, <15	
5	High	≥15, <70	
6	Very High	≥70	

- 7.4.2 The following maximum results have been compared with the criteria outlined above:

- Maximum flow = 32.2 l/hr

- Maximum Methane = 21.3 %v/v
- Maximum Carbon Dioxide = 5.8 %v/v
- Maximum Q_{hg} = 1.8676 l/hr (methane)

- 7.4.3 The monitoring dataset indicates the site to fall into Characteristic Situation 3 (CS3).
- 7.4.4 Elevated concentrations of Methane were recorded at the site, up to 21.3%v/v within BH202, exceeding the CS1/CS2 threshold.
- 7.4.5 A single slightly elevated concentration of Carbon Dioxide was recorded in BH302 exceeding the CS1/CS2 threshold. This value combined with a high positive flow on the same monitoring visit has resulted in the CS3 classification.
- 7.4.6 The monitoring well response zone in BH302 is within natural glacial clays and sandstone and as such there is no obvious source from which significant flows are being generated.
- 7.4.7 In addition to the significant positive flow, a significant negative flow (i.e. flow from the external atmosphere into the well) was recorded in BH302 during the previous monitoring visit. The groundwater level rose from 4.66 to 3.71 between these two visits to rest within cohesive glacial clay soils. It is therefore likely that gas flows recorded in that well are a result of barometric pumping effectively pressurizing/depressurizing the air within the monitoring well, rather than a build-up of ground gas, and is not considered representative of the actual ground gas regime. This is in line with CL:AIRE RB17 – A Pragmatic approach to Ground Gas Risk Assessment.
- 7.4.8 Only 1 no other value of calculated hazardous gas flow rate was recorded within the CS2 range; all other values were recorded within CS1.
- 7.4.9 Given the concentrations of methane and carbon dioxide exceed CS1/CS2 threshold in a number of instances, the site can therefore be characterised as **Characteristic Situation 2**. Under CS2 ('low' gas risk) basic gas protection measures would be required for the proposed structures.
- 7.4.10 If the contaminant hotspots described in Section 6 are to be left in-situ, the necessary hydrocarbon resistant membrane would also satisfy the requirement for a CO₂ gas resistant membrane as part of the CS2 ground gas mitigation solution.
- 7.4.11 The elevated methane concentrations recorded within BH202 is within an area observed to be impacted with diesel contamination. This can "confuse" the gas monitor as on occasion volatile hydrocarbons can be misread as methane. A gas sample has been collected from this borehole and analysis has been undertaken to ascertain the nature of these readings. The gas sample recorded a methane concentration of 2.4%, whilst no volatile organic compounds (VOCs) were detected. This suggests that the hydrocarbon contamination in this area did not cause false methane readings during the monitoring programme.

8. Other Development Considerations

8.1 Waste Arisings

- 8.1.1 On the basis of the current information it is likely that the bulk of the Made Ground Materials would be classifiable as “Stable Non-Reactive” and the natural soils classifiable as “Inert” for landfill disposal. However a number of potentially hazardous hotspots have been identified within samples tested at the subject site.
- 8.1.2 An appropriate waste characterisation can only be undertaken on the material due to be disposed of via further chemical testing; which should be completed prior to making disposal arrangements. In all cases where excess soils require off-site disposal, the materials need to be managed under the appropriate legislation and consideration given to any remedial techniques that could be used to improve the soil.
- 8.1.3 For Inert Waste and Hazardous Waste disposal, an allowance will need to be made for adequate Waste Acceptance Criteria (WAC) testing with appropriate consideration of the additional time and cost associated with this.

8.2 Health, Safety & Environment

- 8.2.1 Despite the findings of the testing there remains a potential for more-significantly impacted soils to be encountered; consideration should therefore be given to the level of PPE that should be provided to future site operatives.
- 8.2.2 All work on site should be conducted in accordance with appropriate Health and Safety guidance, with particular reference to HSG66 (HSE, 1991).
- 8.2.3 Care should be taken to minimise the risk of potentially contaminative incidents occurring during redevelopment. Good working practices should be adopted during construction works in order to minimise the risk of contamination occurring as a result of spillage or leakage of fuels, oils or chemicals stored or used at the site during re-development. All such materials should be sited on an impervious base within a bund and should be adequately secured. In particular, care should be taken to prevent fuel, oils or other mobile contamination sources from entering any surface water drains at the site.
- 8.2.4 Throughout any redevelopment works, due regard should be given to potential detrimental effects on the surroundings including noise, vibration, odour and dust.

8.3 Potable Water Supply

- 8.3.1 There are currently no (fully adopted) national standards for the protection of potable water supply pipes in potentially contaminated ground. However, the UKWIR has published guidance in this respect and site testing should be undertaken with due recognition of this guidance.

- 8.3.2 On the basis of the ground conditions encountered, it is likely that specific protection measures may be required potable water supply for the subject development. It is recommended that consultation is undertaken with the local supplier (United Utilities) to confirm this and a Water Pipeline Risk Assessment undertaken.

9. Conclusion & Recommendations

9.1 Background & Scope

- 9.1.1 Capita Property and Infrastructure Ltd ("Capita") was commissioned by Rowlinson Constructions Ltd to undertake an intrusive Phase 2 Geo-Environmental Ground Investigation for the proposed residential development of a parcel of land to the south of Bowes Street in Moss Side, Manchester.
- 9.1.2 The site is being considered for redevelopment to comprise an Extra Care unit on the western area of the site fronting Princess Road with residential apartments and houses across the remainder of the site with associated access roads, car parking and landscaping. A proposed development plan is included in Appendix A.
- 9.1.3 The following scope of work was defined and undertaken:
- Formation of 6no window sample boreholes with coring attachment including in-situ geotechnical testing;
 - Formation of 30no machine excavated trial pits;
 - Formation of 2no rotary open boreholes;
 - Formation of 25no machine excavated delineation trial pits;
 - Installation of 8no gas and groundwater monitoring wells;
 - Sampling and laboratory testing of soil and groundwater for chemical and geotechnical purposes;
 - Ground gas monitoring (6no visits over 3no months, plus additional 2no visits); and
 - Provision of a combined factual and interpretive report.

9.2 Ground Conditions

- 9.2.1 The ground conditions encountered during the intrusive investigation largely confirmed the anticipated geology and in general comprised Made Ground deposits overlying Glacial Till deposits which overly solid Sandstone strata of the Chester Pebble Beds Formation of the Sherwood Sandstone Group.
- 9.2.2 Made Ground comprised both granular and cohesive material and was encountered in all of the exploratory holes. The Made Ground was variable comprising silty SAND, silty gravelly SAND, clayey sandy GRAVEL, silty sandy GRAVEL, sandy gravelly COBBLES, slightly sandy slightly gravelly CLAY, sandy slightly gravelly CLAY and slightly sandy gravelly CLAY. Gravel typically comprised fragments of brick, metal, concrete, Victorian concrete, sandstone, mudstone, siltstone, coal, clinker, slag, coal, plastic, timber, glass, ceramic and slate. Frequent cobbles were recorded across the subject site, and generally consisted of brick, concrete, Victorian concrete and sandstone.

- 9.2.3 Glacial Till deposits comprised both cohesive and granular strata. Cohesive Till deposits comprised firm to very stiff brown mottled grey slightly sandy slightly gravelly CLAY, firm silty CLAY and stiff sandy slightly gravelly CLAY. Granular strata was encountered within a single locality and comprised silty SAND & GRAVEL. Cobbles were noted at various locations around the subject site, within cohesive Glacial Till deposits.
- 9.2.4 In-situ penetration testing within the Glacial Till deposits gave N-values ranging from 6 to 20, highlighting the variability of the soils. However an increase in strength with depth can be observed within the data set.
- 9.2.5 Bedrock of Chester Pebble Beds Formation was encountered within all exploratory boreholes and a number of trial pit locations primarily to the west of the subject site. Bedrock was found to underlie Made Ground and Glacial Till deposits at depths of between 1.60m and 6.45mbgl. The strata comprised very weak to medium strength weathered reddish brown Sandstone. The uppermost weathered deposits were recovered as reddish brown silty fine to coarse SAND.
- 9.2.6 All boreholes were terminated with SPT N-Value refusals of greater than 50 within the sandstone bedrock.
- 9.2.7 Groundwater entries were recorded during exploratory hole formation at depths of between 0.35-3.00mbgl. The majority of the groundwater seepages/strikes were recorded within Made Ground and are not thought to be representative of the true groundwater level, but are perched waters within Made Ground deposits, which are predominantly sitting atop impermeable cohesive Glacial Till deposits. During subsequent monitoring, rest water levels were recorded in the standpipes at depths of between 0.62 and 2.45mbgl.
- 9.2.8 The rest groundwater levels in BH301 and BH302 between 3.62-4.66mbgl are considered to be representative of the true groundwater within the bedrock aquifer beneath the site.

9.3 Geotechnical Appraisal

- 9.3.1 Given the variable thickness of the Made Ground deposits and the competence of the natural strata across the site, a combination of foundation solutions should be considered for the subject site. In areas of Made Ground less than 1.80mbgl shallow spread foundations may be considered as a suitable founding option. According to the SPT 'N' values observed at the subject site, the suitable founding strata will be either firm to very stiff clay or weathered sandstone bedrock of the Chester Pebble Beds. The uppermost cohesive Glacial Till deposits can be conservatively expected to provide a bearing capacity ranging from 80-150kN/m² depending on the stiffness of the strata. The depth to competent founding strata across the site varies significantly. An indicative foundation depth zoning plan is presented in Appendix A.
- 9.3.2 A bored, cast in-situ pile type will likely be the most appropriate solution allowing penetration through and beyond any residual obstructions in the Made Ground. Piles will likely be required to transmit structural loads to competent sandstone or cohesive glacial till at depths of around 2.00 to 4.00mbgl.

- 9.3.3 Any piling works should adhere to the EA guidance on piling through contaminated soils, so as to prevent any mobilisation of contamination into underlying natural soils or the Principal Bedrock Aquifer. Furthermore piling may create migration pathways for hazardous ground gases, which have been identified at the subject site.
- 9.3.4 Detailed pile designs (in terms of pile type, depths, and method of installation) would be dependent upon the required working loads and should be undertaken in conjunction with a reputable, specialist, piling contractor; ideally with local experience.
- 9.3.5 Ground improvement techniques may be viable at the subject site through the use of vibro-stone/concrete columns, ideally where the underlying competent strata is granular weathered sandstone bedrock. The subsequent foundations should be 'rafted strips'.
- 9.3.6 Based on the varying, and in places considerable, thickness of Made Ground deposits across the site, suspended floor slabs are recommended to restrict differential settlements.
- 9.3.7 Design/mix of buried concrete should be undertaken in accordance with the appropriate ACEC classification DS-2 AC-1s, of BRE Special Digest 1: 2005 (Concrete in Aggressive Ground).
- 9.3.8 It is likely that new road pavement subgrade exposed at formation levels will comprise cohesive Glacial Till deposits or variable Made Ground deposits and therefore a preliminary design CBR value of 3-5% is recommended.

9.4 Ground & Groundwater Contamination

- 9.4.1 Sampling and testing of the site soils has been undertaken at the site to quantify the level of contamination that could potentially be exposed at the surface in the proposed development.
- 9.4.2 Elevated contaminants within site soils include metals, TPH and PAH. This appears indicative of general site wide contamination which is not unexpected considering the sites historic use, although some "non-contaminated" areas do exist within the footprint of the site. Much of the underlying natural Glacial Till is "non-contaminated" and the majority of exceedances are recorded within perched waters within Made Ground deposits which sit atop the Glacial Till deposits.
- 9.4.3 The driving exposure pathways for the majority of these contaminants comprise direct exposure pathways including soil ingestion/inhalation and dermal contact. Therefore, in areas with buildings/external hard-standing or similar, no such potential pollution linkage would exist, and hence no specific remedial measures would be required. However in the areas of landscaping and private garden areas the potential contamination linkage will need to be broken by capping with a suitable thickness (600mm) of uncontaminated cover soils, in general landscaping areas this thickness could likely be reduced to 300mm. Clean cover soils in landscaped areas will also prevent new planting from being affected by phytotoxic conditions.

- 9.4.4 Elevated levels of Naphthalene were encountered within 7no soil samples (TP214, TP220, TP224, TP225, TP229, BH203 and BH206). Naphthalene can present a risk through inhalation of volatile vapour and therefore delineation sampling and testing was undertaken. Delineation of the diesel impact was also undertaken to ascertain the risk to the underlying Principal Bedrock Aquifer.
- 9.4.5 The site Made Ground soils contain phytotoxic (*poisonous to plants*) elements of copper and zinc at concentrations which exceed the thresholds set out in the relevant British Standards for topsoil and subsoil. There is no useable volume of topsoil on the site; therefore an allowance will need to be made for the import of clean topsoil/subsoil to support plant growth in new soft landscaped areas.
- 9.4.6 Following the initial phase of Capita investigation 3no samples of groundwater were obtained from boreholes, with a suitable quantity of groundwater at the time of sampling. Contamination exceedences include PAH species Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(ghi)perylene, Benzo(a)pyrene, and Indeno(123-cd)pyrene. The samples did not however record elevated hydrocarbon concentrations.
- 9.4.7 During the subsequent phase of Capita intrusive investigation 2no rotary boreholes were installed with monitoring wells targeting the natural strata and screening off the shallow Made Ground deposits.
- 9.4.8 Elevated Nickel, PAHs and heavy-end hydrocarbons were recorded within groundwater obtained from BH301. An additional groundwater sample was obtained by Capita and tested to determine whether the contamination at this location was showing signs of decreasing.
- 9.4.9 The additional sample identified a reduction in the concentration of Nickel and Benzo(b)fluoranthene, however an additional exceedance of Arsenic was recorded, and the heavy end hydrocarbon fraction of Aromatic C16-C21 had increased. Thus the elevated contaminant concentrations within the hydrocarbon hotspot area is deemed representative of the true groundwater beneath this area of the subject site. Remedial action is therefore likely to be required to nullify the diesel contamination within the uppermost weathered Sherwood Sandstone.

9.5 Delineation Investigations

- 9.5.1 Following the main bulk of intrusive investigations, delineation investigations were undertaken around areas of identified volatile contamination.
- 9.5.2 The extent of contamination was refined and is illustrated in an indicative contamination zoning plan in Appendix A.
- 9.5.3 The majority of the recorded contamination is within the shallow Made Ground deposits. The single exception to this is at the location of TP214 where elevated hydrocarbons were recorded within the uppermost weathered Sherwood Sandstone at a depth of 4.20mbgl.

- 9.5.4 Across the majority of the site the contaminated Made Ground soils are underlain by cohesive Glacial strata which will effectively sever the migration pathway to the underlying bedrock aquifer. In this situation the hotspots could be left in-situ; however hydrocarbon resistant membranes would be required for all properties within the affected areas. Areas of hardstanding and landscape capping would remove the remaining direct contact pathway between the contamination and the site end-user.
- 9.5.5 Alternatively the impacted Made Ground soils could be excavated and removed from site; eliminating the need for a hydrocarbon resistant membrane within new structures.
- 9.5.6 In the location of TP214, impacted Made Ground soils immediately overlie strata of the Sherwood Sandstone. In this area samples from the uppermost weathered Sandstone also contained elevated hydrocarbon concentrations. Groundwater samples collected from BH301 confirms that the contamination in this area is negatively impacting the underlying groundwater, and thus it may be necessary to remediate the uppermost weathered sandstone, possibly by excavation and removal of all impacted material in the vicinity or by soil stabilisation methods

9.6 Ground Gas

- 9.6.1 Based on the gas monitoring dataset, the site and proposed redevelopment is indicated to classify as Characteristic Gas Situation CS2. Under CS2 ('Low gas risk') basic gas protection measures would be required for the proposed structures.

9.7 Drainage

- 9.7.1 On the basis of the findings presented in this report, the ground conditions at the site with respect to the impermeable Glacial Till deposits are unlikely to provide sufficient infiltration to allow Soakaway drainage to be utilised in the proposed development. Furthermore Soakaways are not recommended at this stage within the underlying Chester Pebble Beds formation due to the presence of potentially mobile contamination recorded at the subject site.

9.8 Development Considerations & Waste Soil

- 9.8.1 It is likely that the development of the site will generate Stable Non Reactive waste soils (Made Ground) and inert material (natural soils). However a number of potentially hazardous hotspots have been identified within samples tested at the subject site. Segregation of the various materials will be critical to minimise disposal costs.

9.9 Further Work

- 9.9.1 In order to satisfy and enable the discharge of the relevant Planning Conditions (including pre-commencement conditions), it is recommended that the findings of this report (with respect to contamination) be formalised in a development-specific Remediation Statement and be submitted to the Local Planning Authority for their approval.

- 9.9.2 On the basis of the ground conditions encountered, specific protection measures may be required for potable water supply for the development. It is recommended that consultation is undertaken with the local supplier (United Utilities) to confirm this and a Water Pipeline Risk Assessment undertaken.

10. References

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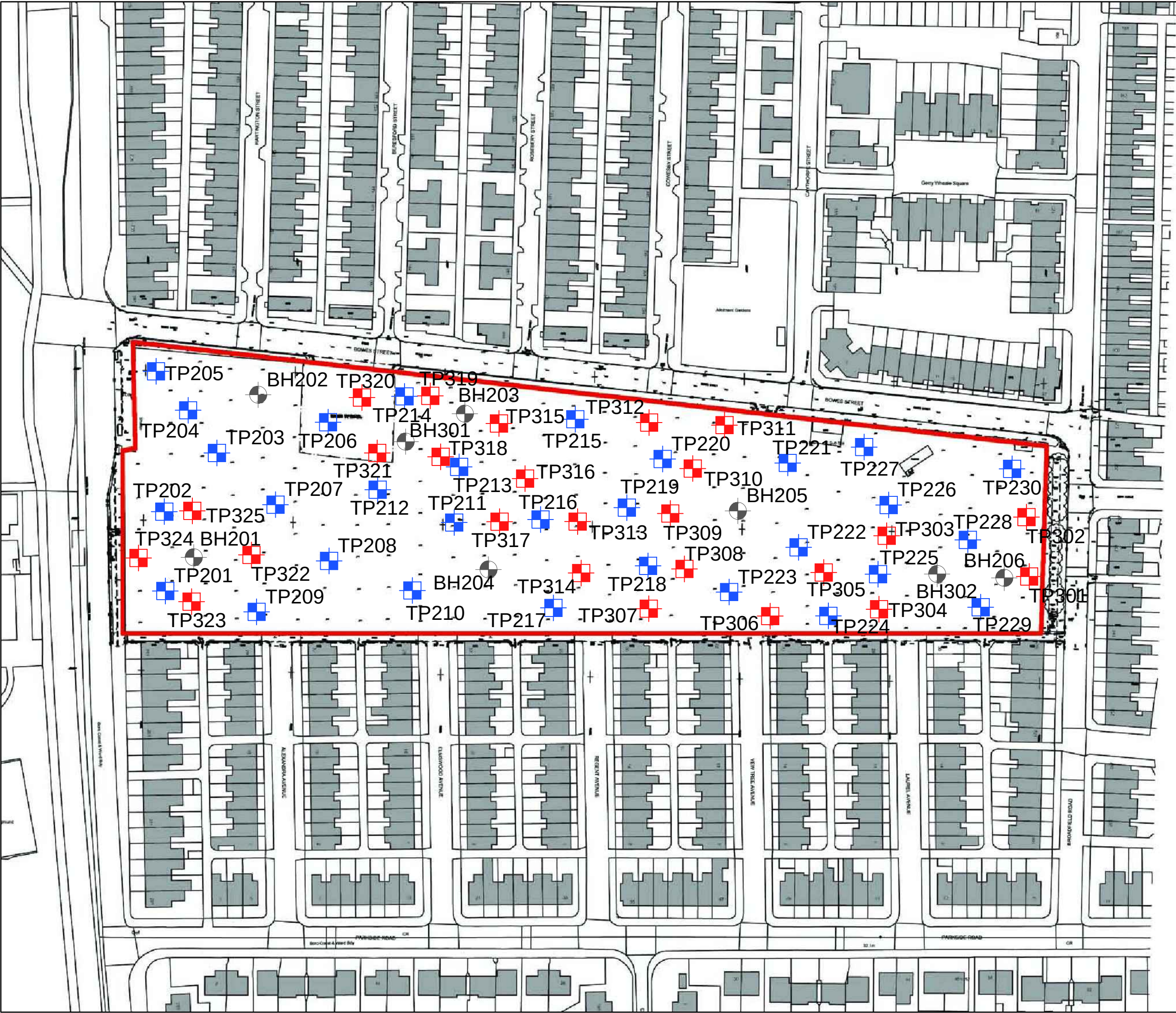
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Appendix A Figures and Drawings



GENERAL NOTES

Do not scale from this drawing. Work from figured dimensions only. All dimensions are in millimetres u.n.o.

No deviation from the details shown on this drawing will be allowed without prior permission in writing.

All drawings are to be read in conjunction with all architects, engineers and specialist drawings and details.

- Key:
- Borehole Location
 - Trial Pit Location
 - Delineation Trial Pit Location

Rev	Date	Revision	By	Checked	Authorised

Client:
Rowlinson Constructions Ltd

Project:
Bowes Street

Title:
Exploratory
Hole Location Plan

Property and Infrastructure, Engineering
MANCHESTER
Clemence House, 9 Mellor Road
Cheadle Hulme, Cheshire, SK8 5AT
Tel: (+44) 0161 486 1521
www.capitaproperty.co.uk

Offices also at:
Bristol Redditch Berkhamsted
London Sheffield Southampton
Watford Glasgow
Special Projects: Cheadle Hulme

Drawn at MANCHESTER	Scale @ A3 SCALE	Date Feb '16
Drawn EY	Checked DM	Authorised DM
Project No.: CS088198	Drawing No.: 5	Revision: -



GENERAL NOTES

Do not scale from this drawing. Work from figured dimensions only. All dimensions are in millimetres u.n.o.

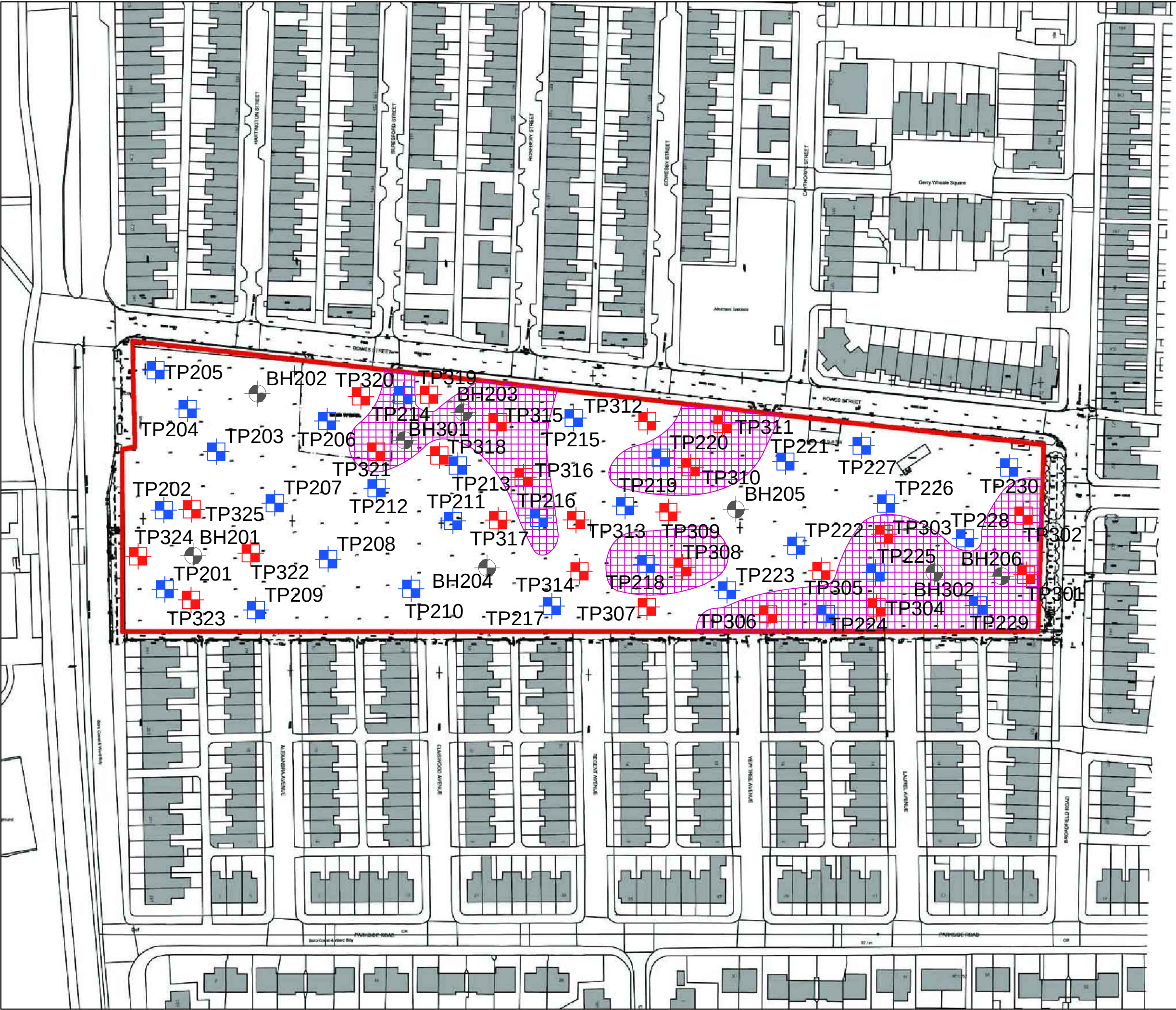
No deviation from the details shown on this drawing will be allowed without prior permission in writing.

All drawings are to be read in conjunction with all architects, engineers and specialist drawings and details.

Key:

- Borehole Location
- Trial Pit Location
- Founding Strata Greater than 1.80mbgl
- Founding Strata Less than 1.80mbgl
- Indicative Depth to Top of Founding Strata

Rev	Date	Revision	By	Checked	Authorised
Client: Rowlinson Constructions Ltd					
Project: Bowes Street					
Title: INDICATIVE FOUNDATION ZONING PLAN					
Property and Infrastructure, Engineering					
MANCHESTER					
Clemence House, 9 Mellor Road Cheadle Hulme, Cheshire, SK8 5AT Tel: (+44) 0161 486 1521 www.capitaproperty.co.uk					
Offices also at: Bristol Redditch Berkhamsted London Sheffield Southampton Watford Glasgow Special Projects: Cheadle Hulme					
Drawn at MANCHESTER		Scale @ A3 NTS		Date Dec '16	
Drawn KR		Checked AW		Authorised DM	
Project No.: CS088198		Drawing No.: 03		Revision: C	



GENERAL NOTES

Do not scale from this drawing. Work from figured dimensions only. All dimensions are in millimetres u.n.o.

No deviation from the details shown on this drawing will be allowed without prior permission in writing.

All drawings are to be read in conjunction with all architects, engineers and specialist drawings and details.

- Key:
- Borehole Location
 - Trial Pit Location
 - Delineation Trial Pit Location
 - Location of Naphthalene and Volatile Hydrocarbon Contamination Exceedances

Rev	Date	Revision	By	Checked	Authorised

Client:
Rowlinson Constructions Ltd

Project:
Bowes Street

Title:
Indicative Contamination Hotspot Plan

CAPITA

Property and Infrastructure, Engineering

MANCHESTER
Clemence House, 9 Mellor Road
Cheadle Hulme, Cheshire, SK8 5AT
Tel: (+44) 0161 486 1521
www.capitaproperty.co.uk

Offices also at:

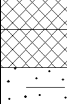
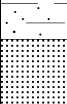
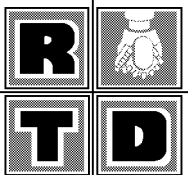
Bristol	Redditch	Berkhamsted
London	Sheffield	Southampton
Watford	Glasgow	

Special Projects: Cheadle Hulme

Drawn at MANCHESTER	Scale @ A3 SCALE	Date Feb '16
Drawn EY	Checked DM	Authorised DM
Project No.: CS088198	Drawing No.: 4	Revision: -

Appendix B Exploratory Hole Logs

ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543					Site Bowes Street, Manchester.					Job No. 24/16	
					ClientCapita					Borehole BH201 Page 1 of 1	
					Date 19/10/16		O.D. Level				
Day	Water Level	Casing Depth	Strata Depth	Description of Strata	Leg- end	Inst.	Reduced Level	Sample Type	Depth	'N' Value	
			G.L.	Grass/vegetation over (dense) red/ brown clayey, fine-coarse, subangular GRAVEL/COBBLES of brick, concrete & mortar. MADE GROUND (0.90)				ES D	0.40 0.70		
			0.90	Firm brown very silty CLAY. (0.75)				ES C B	1.00 1.00 - 1.45 1.00 - 1.50	6	
			1.65	Very weak/weathered red SANDSTONE uncemented. (0.80)				C D	2.00 - 2.45 2.00	90	
			2.45	Base of Borehole							
Symbols U - undisturbed sample J - jar sample B - bulk sample W - water sample N - Standard Penetration Test Δ - Water entry ▲ - Water level											
Ground Water Entry	Estimated Rate of Entry	Observa- tion Time (mins)	Water Level Rising to	Depth of Casing at Entry	Depth of Casing to Seal	Date	Standing Water Level	Condition of Borehole Cased / Open			
Remarks Borehole recorded as dry. SPT/CPT blows recorded 1.0-1.45m 1/2/2/1/2/1, 2.0-2.45m 8/9/16/19/26/29.											
R T D											

ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543					Site Bowes Street, Manchester.					Job No. 24/16	
					ClientCapita					Borehole BH202 Page 1 of 1	
					Date 18/10/16			O.D. Level			
Day	Water Level	Casing Depth	Strata Depth	Description of Strata	Leg-end	Inst.	Reduced Level	Sample Type Depth		'N' Value	
			G.L. 0.20 0.85 1.10 1.60 2.26	Grass/vegetation over red fine-medium SAND/TOPSOIL. MADE GROUND (0.20) (Very dense) grey very sandy (fine-medium) fine-coarse subangular GRAVEL/ COBBLES of concrete, brick & mortar. Refusal by percussive methods borehole continued by rotary coring. Slight hydrocarbon/oil odour. MADE GROUND (0.65) (Borehole continued by percussion) medium dense red/brown very gravelly fine-medium SAND, gravel is fine-coarse of brick & concrete. MADE GROUND (0.25) Firm and stiff brown very sandy (fine-medium) CLAY. (0.50) weak/weathered red SANDSTONE, uncemented. (0.66) Base of Borehole	      				ES D 0.50 0.60 D/N ES B 1.00 - 1.45 1.10 1.10 - 1.60 D 2.00 D/N 2.30 - 2.56	14 Ref	
Symbols U - undisturbed sample J - jar sample B - bulk sample W - water sample N - Standard Penetration Test Δ - Water entry ▲ - Water level											
Ground Water Entry	Estimated Rate of Entry	Observation Time (mins)	Water Level Rising to	Depth of Casing at Entry	Depth of Casing to Seal	Date	Standing Water Level	Condition of Borehole Cased / Open			
Remarks Borehole recorded as dry. SPT/CPT blows recorded 1.0-1.45m 5/6/4/4/3/3, 2.3-2.555m 30/31/52 50 for 30mm. Concrete cored 0.2-0.85m bgl.											
											

ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543					Site Bowes Street, Manchester.			Job No. 24/16	
					Client Capita			Borehole BH203 Page 1 of 1	
					Date 18/10/16		O.D. Level		

Day	Water Level	Casing Depth	Strata Depth	Description of Strata	Leg-end	Inst.	Reduced Level	Sample Type	Sample Depth	'N' Value
			G.L.	Grass/vegetation over red fine-medium SAND/TOPSOIL. MADE GROUND (0.15)						
			0.15	(Very dense) grey/red/brown very sandy (fine-coarse) fine-coarse, subangular GRAVEL/COBBLES of brick, concrete & mortar. Refusal by percussive methods, borehole advanced by rotary coring. MADE GROUND (0.55)				ES	0.50	
			0.70	(Borehole continued by percussion) (Dense) grey/brown/red sandy (fine-medium) fine-coarse, subangular GRAVEL of brick & concrete. MADE GROUND (0.40)				D	0.60	
			1.10	Soft black gravelly, silty CLAY, oil/hydrocarbon odour, visible oil contamination, deposit is wet. (0.20)				C	1.00 - 1.45	5
			1.30	Driving brick, no recovery. (0.80)				ES	1.20	
			2.10	Soft brown silty CLAY. (0.50)				C	2.00 - 2.45	14
			2.60	Weak/weathered red SANDSTONE, uncemented, strong hydrocarbon/fuel/oil odour. (0.85)				D	2.50	
			3.45	Base of Borehole				C	3.00 - 3.45	107
								D	3.00	

Symbols U - undisturbed sample J - jar sample B - bulk sample W - water sample N - Standard Penetration Test Δ - Water entry ▲ - Water level									
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Ground Water Entry	Estimated Rate of Entry	Observation Time (mins)	Water Level Rising to	Depth of Casing at Entry	Depth of Casing to Seal	Date	Standing Water Level	Condition of Borehole Cased / Open
1.10	very slow							

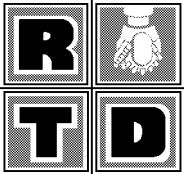
Remarks NOTE: relic monitoring well located 3m NE of BH203 named as BH203A dipped to 25m bgl, standing water level 4.5m bgl included in survey. water entry @ 1.1m bgl recorded as very slow. SPT/CPT blows recorded 1.0-1.45m 9/8/1/1/2/1, 2.0-2.45m 6/6/9/1/1/3, 3.0-3.45m 9/10/19/20/32/36.	
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ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543					Site Bowes Street, Manchester.			Job No. 24/16	
					Client Capita			Borehole BH204 Page 1 of 1	
					Date 18/10/16		O.D. Level		

Day	Water Level	Casing Depth	Strata Depth	Description of Strata	Leg-end	Inst.	Reduced Level	Sample Type	Sample Depth	'N' Value
	Δ	1.00	G.L.	Grass/vegetation over (dense) red/grey/brown very sandy (fine-coarse) fine-coarse subangular GRAVEL of brick, concrete & mortar, Slight oil odour. Deposit is wet. MADE GROUND (0.45)				ES D	0.30 0.40	
			0.45	Soft grey sandy (fine-medium), silty CLAY. (0.45)				ES C B	0.90 1.00 - 1.45 1.00 - 1.50	13
			0.90	Stiff brown/grey mottled silty CLAY. (1.10)						
			2.00	Very stiff brown/grey gravelly CLAY, gravel is fine-medium subangular-subrounded of mudstone & siltstone. (0.80)				D/N B	2.00 - 2.45 2.50 - 2.80	17
			2.80	Weak/weathered red SANDSTONE, uncemented. (0.65)				D/N	3.00 - 3.45	80
			3.45	Base of Borehole						

Symbols U - undisturbed sample J - jar sample B - bulk sample W - water sample N - Standard Penetration Test Δ - Water entry ▲ - Water level									
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Ground Water Entry	Estimated Rate of Entry	Observation Time (mins)	Water Level Rising to	Depth of Casing at Entry	Depth of Casing to Seal	Date	Standing Water Level	Condition of Borehole Cased / Open
0.30	fast				1.00	18/10		

Remarks Water entry @ 0.3m bgl recorded as fast, sealed at 1.0m bgl, borehole dry 1.0-3.45m bgl. SPT/CPT blows recorded 1.0-1.45m 3/3/4/3/3/3, 2.0-2.45m 3/4/4/4/4/5, 3.0-3.45m 5/6/9/15/24/32.	
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ROTARY TEST DRILLING Marshes Farm, Coach Road, off Wigan Road, Hart Common, West Houghton, Bolton BL5 2BT Tel: 01942 - 810348 Fax: 01942 - 840543					Site Bowes Street, Manchester.			Job No. 24/16	
					Client Capita			Borehole BH205 Page 1 of 1	
					Date 19/10/16		O.D. Level		

Day	Water Level	Casing Depth	Strata Depth	Description of Strata	Leg-end	Inst.	Reduced Level	Sample Type	Sample Depth	'N' Value
	Δ		G.L.	Sparce vegetation over (very dense) grey/red/brown very sandy (fine-coarse) fine-coarse, subangular GRAVEL/COBBLES of brick, concrete, timber & mortar. Deposit is wet from 0.6m bgl. MADE GROUND (0.95)				ES D	0.50 0.60	
			0.95	Soft and firm brown/yellow very silty CLAY. (0.65)	x — x x — x —			C ES D	1.00 - 1.45 1.00 1.00	13
			1.60	Stiff/very stiff brown gravelly CLAY, gravel is fine-medium, subangular-subrounded of limestone & coal. (2.80)				C D	2.00 - 2.45 2.00	20
								C D	3.00 - 3.45 3.00	20
								C	4.00 - 4.45	35
			4.40	Weak/weathered red SANDSTONE uncemented. (0.55)				C D	4.50 - 4.95 4.50	147
			4.95	Base of Borehole						

Symbols U - undisturbed sample J - jar sample B - bulk sample W - water sample N - Standard Penetration Test Δ - Water entry ▲ - Water level									
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Ground Water Entry	Estimated Rate of Entry	Observation Time (mins)	Water Level Rising to	Depth of Casing at Entry	Depth of Casing to Seal	Date	Standing Water Level	Condition of Borehole Cased / Open
0.60	very fast							

Remarks Water entry @ 0.6m recorded as very fast. SPT/CPT blows recorded 1.0-1.45m 2/2/2/2/3/6, 2.0-2.45m 3/4/5/5/5/5, 3.0-3.45m 3/4/4/5/5/6, 4.0-4.45m 5/5/6/9/10/10, 4.5-4.95m 10/12/26/36/49/39.	
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[illegible]

Trial Pit Log

Borehole No.

TP201

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 18/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 18/10/2016

Trial Pit Photograph(s)

Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
			▼		MADE GROUND: Greyish brown very silty very sandy GRAVEL with a medium cobble content. Gravel is fine to coarse angular to subangular of brick, concrete, metal, glass, slate and ceramic. Cobbles are angular to subangular of brick and concrete.		[0.50]	0.00
0.75	ES				(MG)	0.50	[0.40]	-0.50
1.00	D		1		MADE GROUND: Dark grey silty slightly sandy GRAVEL. Gravel is fine to coarse angular to subrounded of sandstone, brick, ceramic, sandstone and glass.	0.90	1	-0.90
					(MG)		[1.10]	
					Stiff brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to medium subangular to subrounded of mudstone and limestone.			
			2		(GT - C)			
2.20	BLK				Brown silty SAND & GRAVEL. Gravel is fine to coarse subangular to rounded of mudstone, siltstone and sandstone.	2.00	[0.50]	-2.00
2.20	ES				(GT - G)			
2.60	ES				From 2.00m to 2.50mbgl: Strong diesel odour noted.	2.50	[0.10]	-2.50
			3		Reddish brown weathered SANDSTONE, recovered as silty fine to coarse SAND.			
					(SS)			
					From 2.50m to 2.60mbgl: Strong diesel odour noted.			
					End of Borehole at 2.60m			
			4					
			5					
General Remarks:						Scale: 1:50	Plant: JCB 3CX	Logged By: AW
Stable							Method: TP	Checked By:
Groundwater: Damp from 0.50m to 0.90mbgl.							Contractor: Donelan	

Trial Pit Log

Borehole No.

TP202

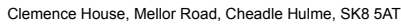
Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 18/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 18/10/2016

Trial Pit Photograph(s)

Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.05	ES				MADE GROUND: Reddish brown silty slightly gravelly fine to coarse SAND. Gravel is fine to coarse angular to subangular of sandstone and brick. (MG)	0.07	[0.07]	0.00 -0.07
1.00	D		1		MADE GROUND: Greyish brown silty sandy GRAVEL with a high cobble content. Gravel is fine to coarse angular to subangular of brick, concrete, metal, sandstone and clinker. Cobbles are angular to subangular of brick and concrete. (MG)	0.90	[0.30] ¹	-0.90
1.30	D				MADE GROUND: Soft to firm dark grey slightly sandy slightly gravelly CLAY with a low cobble content. Gravel is fine to coarse angular to subrounded of brick, mudstone, coal, sandstone and glass. Cobbles are angular to subangular of brick. (MG)	1.20	[0.40]	-1.20
2.00	BLK		2		Firm to stiff brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to medium subangular to subrounded of coal and mudstone. (GT - C)	1.60	[0.60] ₂	-1.60
					Reddish brown weathered SANDSTONE, recovered as silty fine to coarse SAND. (SS)			
					End of Borehole at 2.20m			
			3				3	
			4				4	
			5				5	
General Remarks:						Scale: 1:50	Plant: JCB 3CX	Logged By: AW
Stable							Method: TP	Checked By:
							Contractor: Donelan	

General Remarks:	Scale: 1:50	Plant: JCB 3CX	Logged By: AW
	Stable	Method: TP	Checked By:
		Contractor: Donelan	



Borehole No.

Sheet 1 of 1

Trial Pit Photograph(s)

General Remarks:

Plant:	ICB 3CY
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Stable

Contractor:	Donelan
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Checked
By:

Trial Pit Log

Borehole No.

TP205

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 18/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 18/10/2016

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.20	ES				MADE GROUND: Reddish brown silty gravelly fine to coarse SAND with rootlets. Gravel is fine to coarse angular to subrounded of concrete, brick, plastic, metal and timber. (MG)	0.06	[0.06]	0.00
0.50	BLK						[0.54]	-0.06
0.70	D				MADE GROUND: Grey silty sandy GRAVEL with a medium to high cobble content. Gravel is fine to coarse angular to subangular of brick, concrete and mudstone. (MG)	0.60	[0.70]	-0.60
1.40	ES				MADE GROUND: Firm greyish brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded of brick, ceramic, coal and clinker. (MG)	1.30	[0.30]	-1.30
					MADE GROUND: Soft to firm light brown sandy slightly gravelly CLAY. Gravel is fine to coarse angular to subangular of brick, mudstone and coal. (MG)	1.60	[0.30]	-1.60
2.15	ES				From 1.30m to 1.60mbgl: Strong hydrocarbon/phenol odour noted. MADE GROUND: Reddish brown slightly silty very sandy GRAVEL with a high cobble and boulder content. Gravel is fine to coarse angular to subangular of brick, concrete, ceramic and victorian concrete. Cobbles and boulders are angular to subangular of victorian concrete and brick. (MG)	1.90	[0.20]	-1.90
					MADE GROUND: Brickwork footing, recovered as reddish brown slightly silty gravelly COBBLES. Gravel and cobbles are angular to subangular of brick. (MG)	2.10	[0.10]	-2.10
					Reddish brown weathered SANDSTONE, recovered as silty fine to coarse SAND. (SS)			
					End of Borehole at 2.20m			
General Remarks:						Scale: 1:50	Plant: JCB 3CX	Logged By: AW
Stable							Method: TP	Checked By:
							Contractor: Donelan	

Trial Pit Log

Borehole No.

TP206

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 18/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 18/10/2016

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.30	BLK				MADE GROUND: Light grey slightly silty slightly sandy GRAVEL. Gravel is fine to coarse angular to subangular of limestone. (MG)	0.10	[0.10] [0.30]	0.00 -0.10
0.50	ES				MADE GROUND: Grey slightly silty sandy GRAVEL with a low cobble content. Gravel is fine to coarse subangular to angular of brick, concrete, coal, sandstone and timber. Cobbles are angular to subangular of brick and concrete. (MG)	0.40	[0.15]	-0.40
0.70	ES				At 0.40mbgl: Plastic sheeting. MADE GROUND: Reddish brown silty fine to coarse SAND. (MG) From 0.40m to 0.55mbgl: Diesel odour noted.	0.55		-0.55
					MADE GROUND: Brown very clayey sandy GRAVEL with a high cobble and boulder content. Gravel is fine to coarse subangular to angular of brick, concrete, metal, ceramic, slate, glass and clinker. Cobbles and boulders are angular to subangular of brick and concrete. (MG)		1 [1.55]	
							2	
2.20	D				Firm to stiff brown mottled grey slightly sandy slightly gravelly CLAY with a low to medium cobble content. Gravel is fine to medium subangular to rounded of mudstone and sandstone. Cobbles are subrounded to rounded of mudstone and sandstone. (GT - C)	2.10	[0.40]	-2.10
					Reddish brown weathered SANDSTONE, recovered as silty fine to coarse SAND. (SS)	2.50	[0.30]	-2.50
					End of Borehole at 2.80m		3	
							4	
							5	

General Remarks:

Scale: 1:50

Plant: JCB 3CX

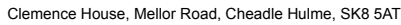
Logged By: AW

Stable

Method: TP

Contractor: Donelan

Checked By:



Borehole No.

Sheet 1 of 1

Trial Pit Photograph(s)

General Remarks:	
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Scale: 1:50

Plant:	ICB 3CY
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Logged By:	AW
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Stable
Groundwater: Damp from 0.50m to 0.90mbgl.

Method:	TP
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Contractor: Donelan

Checked
By:

Trial Pit Log

Borehole No.

TP210

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 19/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 19/10/2016

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.10	ES				MADE GROUND: Greyish brown very silty very sandy GRAVEL with rootlets and a high cobble content. Gravel is fine to coarse angular to subangular of brick, concrete, metal, glass, slate and ceramic. Cobbles are angular to subangular of brick and concrete (MG) Stiff brown mottled grey sandy slightly gravelly CLAY with a low cobble and boulder content. Gravel is fine to medium subangular to subrounded of mudstone and coal. Cobbles and boulders are subrounded to rounded of mudstone. (GT - C) <i>From 2.10 to 2.70mbgl: Very stiff.</i>		[0.40]	0.00
0.50	D					0.40		-0.40
2.70	ES				Reddish brown weathered SANDSTONE, recovered as silty fine to coarse SAND. (SS) <i>End of Borehole at 2.80m</i>	2.60	[0.20]	-2.60

General Remarks:

Stable
Groundwater: Damp from 0.50m to 0.90mbgl.

Scale: 1:50

Plant: JCB 3CX

Method: TP

Contractor: Donelan

Logged By: AW

Checked By:

Trial Pit Log

Borehole No.

TP211

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 19/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 19/10/2016

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level	
Depth	Type	Results							
0.05	ES				MADE GROUND: Reddish brown silty slightly gravelly fine to coarse SAND with rootlets. Gravel is fine to coarse subangular to subrounded of brick, concrete and sandstone. (MG) MADE GROUND: Reddish brown slightly silty sandy gravelly COBBLES. Gravel is fine to coarse angular to subangular of brick, concrete, victorian concrete, metal and glass. Cobbles are angular to subangular of brick, victorian concrete and concrete. (MG) Stiff brown mottled grey sandy slightly gravelly CLAY. Gravel is fine to medium subangular to subrounded of mudstone and coal. (GT - C)	0.10	[0.10]	0.00	
0.20	BLK						[0.60]	-0.10	
0.65	ES						0.70	1	-0.70
1.00	D							[1.00]	
End of Borehole at 1.70m									
							2		
							3		
							4		
							5		
General Remarks: Stable TP211 terminated due to water strike. Groundwater: Damp from 0.50m to 0.90mbgl.						Scale: 1:50	Plant: JCB 3CX	Logged By: AW	
							Method: TP	Checked By:	
							Contractor: Donelan		

General Remarks:

Stable
TP211 terminated due to water strike.
Groundwater: Damp from 0.50m to 0.90mbgl.

Scale: 1:50

Plant: JCB 3CX

Method: TP

Contractor: Donelan

Logged By: AW

Checked By:

Trial Pit Log

Borehole No.

TP212

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 18/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 18/10/2016

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.50	ES				MADE GROUND: Reddish brown silty fine to coarse SAND with rootlets. (MG)	0.10	[0.10]	0.00
1.00	D				MADE GROUND: Grey slightly silty very sandy GRAVEL with a medium to high cobble content. Gravel is fine to coarse angular to subangular of brick, concrete, metal, glass and siltstone. Cobbles are angular to subangular of brick and concrete. (MG)		[0.80]	-0.10
1.00	D				MADE GROUND: Firm to stiff brown mottled grey slightly sandy gravelly CLAY. Gravel is fine to coarse angular to subrounded of brick, mudstone and siltstone. Cobbles are angular to subangular of brick and concrete. (MG)	0.90	1 [0.70]	-0.90
2.50	ES				Firm to stiff brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to medium subangular to rounded of coal and mudstone. (GT - C)	1.60	[0.80]	-1.60
2.50	ES				Reddish brown weathered SANDSTONE, recovered as silty fine to coarse SAND. (SS)	2.40	[0.10]	-2.40
					End of Borehole at 2.50m			
							3	
							4	
							5	

General Remarks: Stable	Scale: 1:50	Plant: JCB 3CX	Logged By: AW
		Method: TP	Checked By:
		Contractor: Donelan	

Checked
By:

Trial Pit Log

Borehole No.

TP214

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 18/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 18/10/2016

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
					MADE GROUND: Brown sandy gravelly COBBLES with a low boulder content. Gravel is fine to coarse angular to subangular of brick, concrete, metal, timber, sandstone, plastic and slate. Cobbles are angular to subangular of brick and concrete. Boulders are angular to subangular of concrete. (MG)		[0.50]	0.00
					MADE GROUND: Brown clayey sandy GRAVEL with a high cobble content. Gravel is fine to coarse angular to subangular of brick, concrete, metal, timber, sandstone, plastic and slate. Cobbles are angular to subangular of brick and concrete. (MG)	0.50	1 [1.50]	-0.50
2.10 2.10	D ES				MADE GROUND: Firm to stiff brown slightly sandy gravelly CLAY with a low cobble content. Gravel is fine to coarse angular to subrounded of brick, concrete, coal, mudstone and metal. Cobbles are angular to subangular of brick and concrete. (MG) <i>From 2.00m to 3.00mbgl: Diesel odour noted.</i>	2.00	2 [2.00]	-2.00
3.00	ES							
4.20	ES				Reddish brown weathered SANDSTONE, recovered as silty fine to coarse SAND. (SS) <i>From 4.00m to 4.50mbgl: Strong diesel odour noted.</i> End of Borehole at 4.50m	4.00	4 [0.50]	-4.00
							5	

General Remarks:

Stable
Groundwater seepage at 3.00mbgl

Scale: 1:50

Plant: JCB 3CX

Method: TP

Contractor: Donelan

Logged By: AW

Checked By:

Trial Pit Log

Borehole No.

TP216

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 19/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 19/10/2016

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.60	ES		▼		MADE GROUND: Reddish brown silty gravelly fine to coarse SAND. Gravel is fine to coarse angular to subrounded of brick and concrete. (MG)	0.07	[0.07]	0.00
1.00	D		1		MADE GROUND: Brown slightly silty slightly sandy gravelly COBBLES. Gravel is fine to coarse angular to subangular of brick, concrete, sandstone and mudstone. Cobbles are angular to subangular of brick and concrete. (MG)	0.70	[0.63]	-0.07
					Firm to stiff brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to rounded of coal and limestone. (GT - C)		[0.60]	-0.70
					End of Borehole at 1.30m			
			2				2	
			3				3	
			4				4	
			5				5	

General Remarks:

Stable
Groundwater seepage recorded at 0.50mbgl.
TP216 terminated due to significant groundwater strike.

Scale: 1:50

Plant: JCB 3CX

Method: TP

Contractor: Donelan

Logged By: AW

Checked By:

Trial Pit Log

Borehole No.

TP217

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 19/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 19/10/2016

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.20	BLK		▼	[Pattern]	MADE GROUND: Brown silty sandy GRAVEL with a medium to high cobble content. Gravel is fine to coarse angular to subangular of brick, concrete, mudstone, plastic, timber, slate. Cobbles are angular to subangular of brick and concrete. (MG) Firm to stiff brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to rounded of coal and sandstone. (GT - C)		[0.40]	0.00
0.35	ES					0.40		-0.40
0.50	D							
0.50	ES							
			1				1	
			2				[2.75]	
			3				3	
			4				4	
			5				5	
End of Borehole at 3.15m								
General Remarks:						Scale: 1:50	Plant: JCB 3CX	Logged By: AW
Stable Groundwater seepage recorded at 0.35mbgl.							Method: TP	Checked By:
							Contractor: Donelan	

Trial Pit Log

Borehole No.

TP218

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 19/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 19/10/2016

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.70	ES		▼		MADE GROUND: Grass over red brown slightly clayey slightly gravelly fine to medium SAND with frequent rootlets. Gravel is fine to coarse subrounded of sandstone and brick. (MG)	0.10	[0.10]	0.00
1.40	ES		1		MADE GROUND: Grey slightly clayey sandy fine to coarse angular to subrounded GRAVEL of brick, concrete, wood, steel and plastic. (MG)		[1.10]	-0.10
1.60	D				From 0.10m to 1.20mbgl: Hydrocarbon odour noted.		1	
					Firm grey mottled brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium subangular to subrounded of sandstone and coal. (GT - C)	1.20	[0.60]	-1.20
			2		End of Borehole at 1.80m		2	
			3				3	
			4				4	
			5				5	
General Remarks:						Scale: 1:50	Plant: JCB 3CX	Logged By: AW
Stable Groundwater seepage recorded at 0.35mbgl.							Method: TP	Checked By:
							Contractor: Donelan	

General Remarks: Terminated due to difficult digging.	Scale: 1:50	Plant: JCB 3CX	Logged By: AW
		Method: TP	Checked By:
		Contractor: Donelan	

Trial Pit Log

Borehole No.

TP222

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 19/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 19/10/2016

Trial Pit Photograph(s)

Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.40	ES				MADE GROUND: Dense grey brown very sandy fine to coarse angular to subangular GRAVEL of brick, concrete, steel and plastic with frequent cobbles and boulders of brick, concrete and stone setts. (MG)		[1.50]	0.00
2.00	D				Firm to stiff brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to medium subangular to subrounded of coal, sandstone and shale. (GT - C) <i>From 2.00mbgl: Stiff.</i>	1.50	[1.10]	-1.50
					End of Borehole at 2.60m			

General Remarks: Terminated due to difficult digging.	Scale: 1:50	Plant: JCB 3CX	Logged By: AW
		Method: TP	Checked By:
		Contractor: Donelan	

Trial Pit Log

Borehole No.

TP223

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 19/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 19/10/2016

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.50	ES				MADE GROUND: Brown slightly sandy fine to coarse angular to subangular GRAVEL of brick, concrete, sandstone and rootlets with medium cobble content of brick. (MG) MADE GROUND: Soft grey slightly sandy gravelly CLAY with frequent boulders of brick. Gravel is fine to coarse angular to subangular of brick, concrete, plastic and tarmacadam. (MG) <i>From 0.10m to 0.90mbgl: Tar odour noted.</i> Firm to stiff brown mottled grey slightly gravelly slightly sandy CLAY. Gravel is fine to coarse subangular to subrounded of quartzite and coal. (GT - C) <i>From 1.60m to 2.1mbgl: Stiff.</i>	0.10	[0.10] [0.80]	0.00 -0.10
2.20	D				Very stiff brown slightly gravelly clay. Gravel is fine to medium subrounded of coal. (GT - C) End of Borehole at 2.60m	0.90 2.10	1 [1.20] 2 [0.50]	-0.90 -2.10
							3 4 5	
General Remarks:						Scale: 1:50	Plant: JCB 3CX	Logged By: AW
Terminated due to difficult digging.							Method: TP	Checked By:
							Contractor: Donelan	

Trial Pit Log

Borehole No.

TP224

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 19/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 19/10/2016

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.40	ES		▼	[Pattern]	MADE GROUND: Grey slightly clayey slightly sandy fine to coarse GRAVEL of brick, concrete, coal, plastic, fabric and steel. (MG)	0.30	[0.30]	0.00
0.60	BLK				MADE GROUND: Grey brown medium to coarse angular to subangular GRAVEL of concrete and brick with occasional boulders of concrete. (MG) <i>From 0.30m to 1.50mbgl: Slight hydrocarbon odour.</i>		[1.20] ₁	-0.30
1.80	ES				Firm to stiff brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to medium subangular to subrounded of quartzite and coal. (GT - C) <i>From 2.20mbgl: Stiff.</i>	1.50	[1.30] ₂	-1.50
					End of Borehole at 2.80m		3	
							4	
							5	
General Remarks:						Scale: 1:50	Plant: JCB 3CX	Logged By: AW
Stable Groundwater seepage at 0.90mbgl. TP220 terminated to prevent cross contamination of underlying natural soils.							Method: TP	Checked By:
							Contractor: Donelan	

Checked
By:

Trial Pit Log

Borehole No.

TP226

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 20/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 20/10/2016

Trial Pit Photograph(s)

Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.20	BLK		▼		MADE GROUND: Wood chippings over grey silty sandy GRAVEL with a medium cobble content. Gravel is fine to coarse angular to subrounded of brick, concrete, sandstone, metal timber and plastic. Cobbles are angular to subangular of brick. (MG)		[0.70]	0.00
0.65	ES				MADE GROUND: Soft to firm brown and grey slightly sandy gravelly CLAY with a low to medium cobble content. Gravel is fine to coarse angular to subrounded of brick, timber, clinker, glass, concrete, metal and slate. Cobbles are angular to subangular of brick. (MG) <i>From 0.70m to 2.00mbgl: Hydrocarbon/phenol odour noted on groundwater seepage.</i> <i>From 1.30m to 2.00mbgl: 20cm voids/loose ground recorded.</i>	0.70	1 [1.30]	-0.70
2.00	D				Stiff brown mottled grey sandy slightly gravelly CLAY with a low cobble content. Gravel is fine to coarse subangular to subrounded of sandstone, mudstone and coal. Cobbles are subangular to rounded of mudstone. (GT - C)	2.00	2 [0.20]	-2.00
					End of Borehole at 2.20m			
							3	
							4	
							5	

General Remarks:

Scale: 1:50

Plant: JCB 3CX

Logged By: AW

Stable
Groundwater seepage at 0.60mbgl.

Method: TP

Contractor: Donelan

Checked By:

Trial Pit Log

Borehole No.

TP227

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 20/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 20/10/2016

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.50	D				MADE GROUND: Brown silty sandy gravelly COBBLES. Gravel is fine to coarse angular to subangular of brick, concrete, limestone, ceramic, plastic and metal. Cobbles are angular to subangular of brick and concrete. (MG)	0.40	[0.40]	0.00
1.80	ES				MADE GROUND: Soft to firm brown and grey slightly sandy gravelly CLAY with a low to medium cobble content. Gravel is fine to coarse angular to subrounded of brick, timber, clinker, glass, concrete, metal and slate. Cobbles are angular to subangular of brick. (MG)		1 [1.70]	-0.40
					From 1.40m to 1.90mbgl: Voids/loose ground.			
					From 1.70m to 2.10mbgl: High cobble content.			
					Stiff brown mottled grey sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded of mudstone and coal. (GT - C)	2.10	[0.20]	-2.10
					End of Borehole at 2.30m			
							3	
							4	
							5	
General Remarks:						Scale: 1:50	Plant: JCB 3CX	Logged By: AW
Not Stable Groundwater seepage at 1.70mbgl.							Method: TP	Checked By:
							Contractor: Donelan	

Checked
By:

Trial Pit Log

Borehole No.

TP229

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 20/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 20/10/2016

Trial Pit Photograph(s)

Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.35	ES		▼		MADE GROUND: Grey silty sandy GRAVEL with a medium to high cobble content. Gravel is fine to coarse angular to subrounded of brick, concrete, mudstone, metal, timber, coal and plastic. Cobbles are angular to subangular of brick. (MG)	0.40	[0.40]	0.00
1.10	D		▼		MADE GROUND: Soft to firm brown and grey slightly sandy gravelly CLAY with a high cobble content. Gravel is fine to coarse angular to subrounded of brick, ceramic, clinker, sandstone and concrete. Cobbles are angular to subangular of brick, sandstone and concrete. (MG)		1 [1.50]	-0.40
			2		Stiff brown mottled grey sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded of sandstone and mudstone. (GT - C)	1.90	[0.20]	-1.90
					End of Borehole at 2.10m			
			3				3	
			4				4	
			5				5	

General Remarks:

Scale: 1:50

Plant: JCB 3CX

Logged
By: AW

Not Stable
Groundwater seepage at 0.35mbgl and 1.10mbgl.
TP229 terminated to prevent cross contamination of underlying natural soils.

Method: TP

Contractor: Donelan

Checked
By:

Trial Pit Log

Borehole No.

TP230

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 20/10/2016
Client:	Rowlinson Construction	Ground Level:		End: 20/10/2016

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.10	BLK				MADE GROUND: Grass over brown silty sandy GRAVEL with a high cobble content. Gravel is fine to coarse angular to subangular of brick, concrete, slate, sandstone and ceramic. Cobbles are angular to subangular of brick and concrete. (MG)		[0.35]	0.00
0.10	ES					0.35		-0.35
0.50	D						[1.25]	
					MADE GROUND: Firm to stiff brown slightly sandy gravelly CLAY with a low to medium to high cobble content. Gravel is fine to coarse angular to subrounded of brick, sandstone, coal, clinker, glass, ceramic, mudstone. Cobbles are angular to subangular of brick, sandstone and concrete. (MG)			
1.80	ES				Firm to stiff brown mottled grey sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded of sandstone, mudstone and siltstone. (GT - C)	1.60	[0.30]	-1.60
					End of Borehole at 1.90m		2	
							3	
							4	
							5	

General Remarks:

Stable
Groundwater seepage at 1.60mbgl.

Scale: 1:50

Plant: JCB 3CX

Method: TP

Contractor: Donelan

Logged By: AW

Checked By:

Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
1.30	ES		 1		MADE GROUND: Dense brown slightly clayey sandy fine to coarse angular to subangular GRAVEL of concrete, brick, steel, sandstone, tile and slate with medium cobble content of brick and concrete. (MG)		[1.40]	0.00
					Soft grey slightly gravelly sandy CLAY. Gravel is fine to coarse angular to subrounded of sandstone and coal. (GT - C)	1.40	[0.20]	-1.40
			2		End of Borehole at 1.60m		2	
			3				3	
			4				4	
			5				5	

General Remarks:		Scale: 1:50	Plant: JCB 3CX	Logged By: EY
Stable			Method: TP	Checked By:
			Contractor: Donelan	

Trial Pit Log

Borehole No.

TP302

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 01/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 01/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
1.40	ES		 1		MADE GROUND: Dense brown very sandy fine to coarse angular to subangular GRAVEL of concrete, brick, steel and tile with low cobble content of brick. (MG)		[0.70]	0.00
					MADE GROUND: Firm grey sandy very gravelly CLAY. Gravel is fine to coarse angular to subrounded of brick, sandstone and concrete with medium cobble content of brick. (MG)	0.70	1 [1.00]	-0.70
					Stiff brown mottled grey slightly gravelly sandy CLAY. Gravel is fine to coarse subangular to subrounded of sandstone. (GT - C)	1.70	[0.50] ₂	-1.70
					End of Borehole at 2.20m			
			3				3	
			4				4	
			5				5	
General Remarks:						Scale: 1:50	Plant: JCB 3CX	Logged By: EY
Stable							Method: TP	Checked By:
							Contractor: Donelan	

Trial Pit Log

Borehole No.

TP303

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 01/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 01/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.50	ES		▼		MADE GROUND: Dense brown very sandy fine to coarse angular to subangular GRAVEL of concrete, brick, sandstone, steel and wood. (MG)		[0.40]	0.00
			1		MADE GROUND: Firm dark grey slightly sandy slightly gravelly ashy CLAY. Gravel is fine to coarse angular to subangular of coal, brick, steel, concrete and clinker. (MG) <i>0.40m: Slight oily sheen on water</i>	0.40	[0.80]	-0.40
2.00	ES		2		Firm to stiff grey mottled brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse angular to subrounded of sandstone. (GT - C) <i>1.20-2.70m: Slight sheen and hydrocarbon odour on soil</i> <i>1.60m: Stiff</i>	1.20	[1.50]	-1.20
			3		End of Borehole at 2.70m		3	
			4				4	
			5				5	

General Remarks:

Scale: 1:50

Plant: JCB 3CX

Logged By: EY

Stable

Method: TP

Contractor: Donelan

Checked By:

Trial Pit Log

Borehole No.

TP304

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 01/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 01/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
1.00	ES		<					

Trial Pit Log

Borehole No.

TP305

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 01/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 01/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
1.00	ES		 1		MADE GROUND: Dense brown very sandy fine to coarse angular to subangular GRAVEL of concrete, brick, sandstone, tile and steel. (MG)		[0.50]	0.00
					MADE GROUND: Firm brown grey very sandy very gravelly CLAY. Gravel is fine to coarse angular to subangular of brick, coal, wood, sandstone and clinker with medium cobble content of brick. (MG)	0.50	[0.40]	-0.50
					MADE GROUND: Light brown clayey sandy fine to coarse angular to subangular GRAVEL of sandstone and concrete. (MG)	0.90	[0.30] ¹	-0.90
					Stiff grey brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subrounded of coal, sandstone and mudstone. (GT - C)	1.20	[1.10]	-1.20
					End of Borehole at 2.30m			
		</						

Trial Pit Log

Borehole No.

TP306

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 01/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 01/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.70	ES		▼	1	MADE GROUND: Brown very sandy fine to coarse angular to subangular GRAVEL of concrete, brick, sandstone and steel with low cobble content of brick. (MG)		[0.50]	0.00
					MADE GROUND: Dark grey clayey sandy ashy fine to coarse angular to subrounded GRAVEL of brick, sandstone, mudstone and coal. (MG)	0.50	[0.40]	-0.50
					0.60m: Slight sheen on water Firm to stiff brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subrounded of sandstone and mudstone. (GT - C) 1.40m Stiff.	0.90	1	-0.90
							[1.30]	
							2	
					End of Borehole at 2.20m			
							3	
							4	
							5	

General Remarks:

Scale: 1:50

Plant: JCB 3CX

Logged By: EY

Stable

Method: TP

Contractor: Donelan

Checked By:

Trial Pit Log

Borehole No.

TP307

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 01/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 01/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.80	ES		▼		MADE GROUND: Dense brown very sandy fine to coarse angular to subangular GRAVEL of concrete, brick, sandstone and steel with medium cobble content of brick. (MG)		[1.00]	0.00
			1		Firm to stiff brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subrounded of sandstone and mudstone. (GT - C)	1.00	[1.10]	-1.00
			2		1.20m: Stiff			
			3		End of Borehole at 2.10m			
			4					
			5					

General Remarks:

Stable

Scale: 1:50

Plant: JCB 3CX

Method: TP

Contractor: Donelan

Logged By: EY

Checked By:

Trial Pit Log

Borehole No.

TP308

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 01/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 01/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.60	ES		▼	MADE GROUND: Brown sandy fine to coarse angular to subangular GRAVEL of concrete, brick, sandstone and steel. (MG)			[0.50]	0.00
				Soft to firm brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subrounded of sandstone and mudstone. (GT - C)		0.50	[0.30]	-0.50
				End of Borehole at 0.80m				
			1				1	
			2				2	
			3				3	
			4				4	
			5				5	

General Remarks:

Stable

Scale: 1:50

Plant: JCB 3CX

Method: TP

Contractor: Donelan

Logged By: EY

Checked By:

Trial Pit Log

Borehole No.

TP309

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 01/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 01/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.70	ES		▼		MADE GROUND: Dense brown sandy fine to coarse angular to subangular GRAVEL of concrete, brick, sandstone and tile with high cobble content of concrete and brick. (MG) 0.70m: Slight hydrocarbon odour		[0.90]	0.00
			1		Firm brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded of sandstone. (GT - C)	0.90	1 [1.20]	-0.90
			2				2	
			3				3	
			4				4	
			5				5	
End of Borehole at 2.10m								
General Remarks:						Scale: 1:50	Plant: JCB 3CX	Logged By: EY
Stable							Method: TP	Checked By:
							Contractor: Donelan	

Trial Pit Log

Borehole No.

TP310

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 01/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 01/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
2.10	ES							

Trial Pit Log

Borehole No.

TP311

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 01/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 01/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.70	ES				MADE GROUND: Dense brown slightly clayey very sandy fine to coarse angular to subangular GRAVEL of brick, concrete, sandstone, steel, plastic and rubber with medium cobble content of brick and concrete. (MG)		[0.90]	0.00
					MADE GROUND: Firm brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded of brick, sandstone and steel. (MG)	0.90	1 [0.60]	-0.90
					End of Borehole at 1.50m			
							2	
							3	
							4	
							5	

General Remarks:

Stable. Terminated on relict foundation

Scale: 1:50

Plant: JCB 3CX

Method: TP

Contractor: Donelan

Logged By: EY

Checked By:

Trial Pit Log

Borehole No.

TP312

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 01/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 01/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
1.80	ES				MADE GROUND: Brown very sandy fine to coarse angular to subrounded GRAVEL of brick, concrete, sandstone and steel. (MG)		[1.00]	0.00
					MADE GROUND: Grey brown slightly clayey sandy fine to coarse subangular to subrounded GRAVEL of brick, sandstone, tile and wood with high cobble and boulder content of brick. (MG)	1.00	[1.00]	-1.00
					Firm brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded of sandstone. (GT - C)	2.00	[0.30]	-2.00
					End of Borehole at 2.30m			
							3	
							4	
							5	

General Remarks:		Scale: 1:50	Plant: JCB 3CX	Logged By: EY
Stable.			Method: TP	Checked By:
			Contractor: Donelan	

General Remarks:

Stable.

Scale: 1:50

Plant: JCB 3CX

Method: TP

Contractor: Donelan

Logged By: EY

Checked By:

Trial Pit Log

Borehole No.

TP314

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 01/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 01/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.60	ES		▼		MADE GROUND: Brown very sandy fine to coarse angular to subangular GRAVEL of brick, concrete, sandstone and steel with low cobble content of brick. (MG)		[0.70]	0.00
			1		Firm to stiff brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded of sandstone. (GT - C) 1.00m: Stiff	0.70	1 [1.00]	-0.70
			2		End of Borehole at 1.70m		2	
			3				3	
			4				4	
			5				5	
General Remarks:						Scale: 1:50	Plant: JCB 3CX	Logged By: EY
Stable.							Method: TP	Checked By:
							Contractor: Donelan	

Trial Pit Log

Borehole No.

TP315

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 02/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 02/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.80	ES		▼		MADE GROUND: Brown very sandy fine to coarse angular to subangular GRAVEL of brick, concrete, sandstone, steel and rubber with a slight hydrocarbon odour. (MG)		[1.00]	0.00
					Stiff grey mottled brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse angular to subrounded of coal, mudstone and sandstone. (GT - C)	1.00	[1.80]	-1.00
					End of Borehole at 2.80m		3	
							4	
							5	
General Remarks:						Scale: 1:50	Plant: JCB 3CX	Logged By: EY
Stable.							Method: TP	Checked By:
							Contractor: Donelan	

Trial Pit Log

Borehole No.

TP316

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 02/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 02/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.70	ES				MADE GROUND: Red brown very gravelly medium SAND. Gravel is fine to coarse angular to subrounded of sandstone and brick. (MG) MADE GROUND: Brown slightly clayey very sandy fine to coarse angular to subangular GRAVEL of brick, concrete, sandstone and steel. (MG)	0.05	[0.05]	0.00 -0.05
					MADE GROUND: Firm brown slightly sandy gravelly CLAY. Gravel is fine to coarse angular to subrounded of brick, sandstone and ceramic. (MG) 1.50m: Relict drain	1.10	[1.05]	1 -1.10
					Stiff grey sandy gravelly CLAY. Gravel is medium to coarse subangular of mudstone. (GT - C) End of Borehole at 2.60m	2.40	[1.30]	2 -2.40
							[0.20]	3 -2.40
								4
								5
General Remarks:						Scale: 1:50	Plant: JCB 3CX	Logged By: EY
Stable.							Method: TP	Checked By:
							Contractor: Donelan	

Trial Pit Log

Borehole No.

TP317

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 02/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 02/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.80	ES		▼		MADE GROUND: Red brown very gravelly medium SAND. Gravel is fine to coarse angular to subangular of sandstone and brick. (MG)	0.05	[0.05]	0.00
					MADE GROUND: Brown very sandy fine to coarse angular to subangular GRAVEL of brick, concrete and sandstone. (MG)		[0.85]	-0.05
					0.70m: Slight oily sheen on water			
			1		Firm brown sandy gravelly CLAY. Gravel is fine to coarse angular to subrounded of brick, sandstone and coal. (MG)	0.90	1	-0.90
							[1.10]	
			2		Stiff grey mottled brown slightly sandy gravelly CLAY. Gravel is fine to coarse angular to subangular of mudstone and sandstone. (GT - C)	2.00	2	-2.00
							[0.60]	
					End of Borehole at 2.60m			
			3				3	
			4				4	
			5				5	
General Remarks: Stable.						Scale: 1:50	Plant: JCB 3CX	Logged By: EY
							Method: TP	Checked By:
							Contractor: Donelan	

Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
2.55	ES		 1 2 3 4 5	   	MADE GROUND: Red brown very gravelly medium SAND. Gravel is fine to coarse angular to subangular of sandstone and brick. (MG) MADE GROUND: Brown clayey sandy fine to coarse angular to subangular GRAVEL of brick, concrete, sandstone and steel with medium cobble content of brick. (MG)	0.05	[0.05]	0.00 -0.05
					Firm to stiff orange brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse angular to subrounded of coal, mudstone and sandstone. (GT - C) 2.00m: Stiff	1.60	[0.90]	-1.60
					Red brown weathered SANDSTONE recovered as medium SAND. (CPB) End of Borehole at 2.60m	2.50	[0.10]	-2.50
General Remarks:					Scale: 1:50	Plant: JCB 3CX	Logged By: EY	
Stable.						Method: TP	Checked By:	
						Contractor: Donelan		

Trial Pit Log

Borehole No.

TP319

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 02/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 02/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
					MADE GROUND: Brown clayey sandy fine to coarse angular to subrounded GRAVEL of brick, concrete and sandstone. (MG)		[0.70]	0.00
1.40	ES				MADE GROUND: Red brown very gravelly medium SAND. Gravel is fine to coarse angular to subangular of brick, concrete, sandstone and coal with medium cobble content of brick. (MG)	0.70	[0.50] ₁	-0.70
					MADE GROUND: Firm orange brown mottled grey sandy very gravelly CLAY. Gravel is fine to coarse angular to subrounded of brick, mudstone and sandstone. (MG)	1.20	[1.50] ₂	-1.20
2.80	ES				Red brown weathered SANDSTONE recovered as medium SAND with slight hydrocarbon odour. (CPB)	2.70	[0.20]	-2.70
End of Borehole at 2.90m								
General Remarks:								
Stable.						Scale: 1:50	Plant: JCB 3CX	Logged By: EY
							Method: TP	Checked By:
							Contractor: Donelan	

Trial Pit Log

Borehole No.

TP320

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 02/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 02/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
1.20	ES		1		MADE GROUND: Brown clayey sandy fine to coarse angular to subrounded GRAVEL of brick, concrete and limestone. (MG)		[0.50]	0.00
					MADE GROUND: Brown slightly clayey very sandy fine to coarse angular to subangular GRAVEL of brick, concrete and sandstone with medium cobble content of brick. (MG)	0.50	[0.50]	-0.50
					0.50m: Terram	1.00		-1.00
					MADE GROUND: Dark brown sandy very clayey fine to coarse angular to subrounded GRAVEL of brick, concrete, mudstone and sandstone with medium cobble content of brick and sandstone. (MG)		[0.90]	
			2		MADE GROUND: Firm light brown slightly sandy gravelly CLAY. Gravel is fine to coarse angular to subrounded of concrete, brick and sandstone. (MG)	1.90	2	-1.90
			3				[1.70]	
			4				4	
			5				5	
					End of Borehole at 3.60m			
General Remarks:					Scale: 1:50	Plant: JCB 3CX	Logged By: EY	
Stable.						Method: TP	Checked By:	
						Contractor: Donelan		

Trial Pit Log

Borehole No.

TP321

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 02/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 02/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
1.00	ES				MADE GROUND: Brown sandy fine to coarse angular to subangular GRAVEL of brick, sandstone and limestone. (MG)	0.10	[0.10]	0.00
					MADE GROUND: Red brown very sandy fine to coarse angular to subrounded GRAVEL of brick, concrete and sandstone with medium cobble content of brick. (MG)		[0.60]	-0.10
					0.10m: Terram	0.70		-0.70
					MADE GROUND: Brown sandy very clayey ashy fine to coarse angular to subrounded GRAVEL of brick, concrete, coal, wood and sandstone. (MG)		1 [1.00]	
2.70	ES				MADE GROUND: Firm orange brown sandy gravelly CLAY. Gravel is fine to coarse angular to subrounded of concrete, brick and coal. (MG)	1.70	2 [1.00]	-1.70
					Red brown weathered SANDSTONE recovered as medium SAND. (CPB)	2.70	[0.20]	-2.70
					End of Borehole at 2.90m		3	
							4	
							5	

General Remarks:

Stable.

Scale: 1:50

Plant: JCB 3CX

Method: TP

Contractor: Donelan

Logged By: EY

Checked By:

Trial Pit Log

Borehole No.

TP322

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 02/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 02/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.90	ES		▼		MADE GROUND: Red brown slightly gravelly medium SAND. Gravel is fine to coarse angular to subrounded of brick and sandstone. (MG)	0.10	[0.10]	0.00
			1		MADE GROUND: Brown slightly clayey sandy fine to coarse angular to subrounded GRAVEL of brick, concrete and sandstone with high cobble content of brick and sandstone. (MG)		[1.00]	-0.10
					MADE GROUND: Grey brown sandy gravelly CLAY. Gravel is fine to coarse subangular to subrounded of coal and sandstone. (MG)	1.10	[0.70]	-1.10
			2		Red brown weathered SANDSTONE recovered as medium SAND. (CPB)	1.80	[0.20]	-1.80
					End of Borehole at 2.00m			
			3					
			4					
			5					

General Remarks:

Scale: 1:50

Plant: JCB 3CX

Logged By: EY

Stable.

Method: TP

Contractor: Donelan

Checked By:

Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.50	ES				MADE GROUND: Brown sandy fine to coarse subangular to subrounded GRAVEL of brick, concrete and sandstone. (MG)		[0.40]	0.00
					MADE GROUND: Firm dark grey sandy gravelly CLAY. Gravel is fine to coarse angular to subrounded of brick, coal and sandstone with a slight hydrocarbon odour. (MG)	0.40	[0.30]	-0.40
					Firm red brown mottled grey slightly gravelly sandy CLAY. Gravel is fine to coarse subrounded of sandstone and mudstone. (GT - C)	0.70	[0.80]	-0.70
					Red brown weathered SANDSTONE recovered as medium SAND. (CPB)	1.50	[0.30]	-1.50
					End of Borehole at 1.80m			
							2	
							3	
							4	
							5	
General Remarks:						Scale: 1:50	Plant: JCB 3CX	Logged By: EY
Stable.							Method: TP	Checked By:
							Contractor: Donelan	

Trial Pit Log

Borehole No.

TP324

Sheet 1 of 1

Project Name:	Bowes Street	Project No:	CS088198	Hole Type TP
Site Location:	Moss Side, Manchester	Trial Pit Co-ordinates:	Easting: 0.00 Northing: 0.00	Start: 02/02/2017
Client:	Rowlinson Construction	Ground Level:		End: 02/02/2017

Trial Pit Photograph(s)



Sample and In Situ Testing			Water	Legend	Stratum Description	Depth	Thickness	Level
Depth	Type	Results						
0.50	ES				MADE GROUND: Red brown slightly gravelly medium SAND. Gravel is fine to coarse angular to subangular of brick and concrete. (MG)	0.10	[0.10]	0.00
					MADE GROUND: Firm brown sandy very gravelly CLAY. Gravel is fine to coarse angular to subrounded of brick, concrete and ceramic. (MG)		[0.70]	-0.10
					0.40m: Relict drain	0.80		-0.80
					Firm orange brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to subrounded of sandstone and coal. (GT - C)		1 [1.50]	
					Red brown weathered SANDSTONE recovered as medium SAND. (CPB)	2.30	[0.10]	-2.30
					End of Borehole at 2.40m			
							3	
							4	
							5	

General Remarks:

Stable.

Scale: 1:50

Plant: JCB 3CX

Method: TP

Contractor: Donelan

Logged By: EY

Checked By:

CAPITA Clemence House, Mellor Road, Cheadle Hulme, SK8 5AT				Rotary Log				Borehole No. BH301 Sheet 1 of 1					
Project Name:		Bowes Street				Project No.		CS088198		Hole Type			
Site Location:		Moss Side, Manchester				Borehole Co-Ordinates:		Easting: 0.00 Northing: 0.00		Start: 01/02/2017			
Client:		Rowlinson Construction				Ground Level:		0.00 m AOD		End: 01/02/2017			
Mechanical Log TCR (%) SCR (%) RQD (%) FI				Sample and In Situ Testing DepthTypeResults			Water	Legend	Well	Stratum Description	Depth	Thickness	Level
										MADE GROUND: Stone (Drillers Description) (MG)	0.00	[0.30]	0.00
										MADE GROUND: Reworked boulder CLAY (Drillers Description) (MG)	0.30		-0.30
							1					1	
												[2.40]	
							2					2	
							3			Weathered red SANDSTONE (Drillers Description) (CPB)	2.70		-2.70
							4					4	
							5					5	
							6					6	
												[7.30]	
							7					7	
							8					8	
							9					9	
							10			End of Borehole at 10.000m		10	
General Remarks:						Scale: 1:50		Plant:	Rotary Rig	Logged By: EY			
								Method:		Checked By:			
								Driller:	DanBar Drilling				

CAPITA Clemence House, Mellor Road, Cheadle Hulme, SK8 5AT				Rotary Log				Borehole No. BH302 Sheet 1 of 1					
Project Name:		Bowes Street			Project No.		CS088198		Hole Type				
Site Location:		Moss Side, Manchester			Borehole Co-Ordinates:		Easting: 0.00 Northing: 0.00		Start: 01/02/2017				
Client:		Rowlinson Construction			Ground Level:		0.00 m AOD		End: 01/02/2017				
Mechanical Log TCR (%) SCR (%) RQD (%) FI				Sample and In Situ Testing DepthTypeResults			Water	Legend	Well	Stratum Description	Depth	Thickness	Level
										MADE GROUND: Fill (Drillers Description) (MG)	0.00	[0.80]	0.00
							1			Boulder CLAY (Drillers Description) (GT - C)	0.80	1	-0.80
							2					2	
							3					3	
							4					4	
							5					5	
							6					6	
							7					7	
							8					8	
							9					9	
							10					10	
										Weathered red SANDSTONE (Drillers Description) (CPB)	7.50	[2.50]	-7.50
										End of Borehole at 10.000m			
General Remarks:					Scale: 1:50		Plant: Rotary Rig		Logged By: EY				
							Method:		Checked By:				
							Driller: DanBar Drilling						

Appendix C PSL Geotechnical Report



LABORATORY REPORT



4043

Contract Number: PSL16/5056

Report Date: 11 November 2016

Client's Reference: 4800177423

Client Name: Capita
Clemence House
9 Mellor Road
Cheadle Hulme
Cheshire
SK8 5AT

For the attention of: Elizabeth Yeatman

Contract Title: Bowes Street, Manchester

Date Received: 27/10/2016

Date Commenced: 27/10/2016

Date Completed: 8/11/2016

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson
(Director)

A Watkins
(Director)

R Berriman
(Quality Manager)

D Lambe
(Senior Technician)

S Royle
(Senior Technician)

A Fry
(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP201		D	1.00		Brown slightly gravelly sandy CLAY.
TP201		B	2.20		Brown very sandy clayey GRAVEL.
TP202		D	1.00		Brown gravelly sandy CLAY.
TP202		B	2.00		Brown silty SAND.
TP203		B	0.50		Brown sandy silty GRAVEL with cobbles.
TP204		B	2.00		Brown silty SAND.
TP210		D	0.50		Brown slightly gravelly very sandy CLAY.
TP211		B	0.20		Brown slightly sandy slightly silty gravel of COBBLES.
TP212		D	1.00		Brown slightly gravelly very sandy CLAY.
TP213		D	2.00		Brown slightly gravelly very sandy CLAY.
TP214		D	2.10		Brown slightly gravelly sandy CLAY.
TP217		D	0.50		Brown slightly gravelly sandy CLAY.
TP217		B	0.20		Brown very sandy clayey GRAVEL with cobbles.
TP219		D	3.00		Brown slightly gravelly very sandy CLAY.
TP220		B	0.20		Brown sandy silty gravel of COBBLES.
TP223		D	2.20		Brown slightly gravelly sandy CLAY.
TP224		B	0.60		Brown slightly sandy clayey GRAVEL with cobbles.
TP226		D	2.00		Brown slightly gravelly sandy CLAY.
TP227		D	0.50		Brown slightly gravelly sandy CLAY.

	Checked / Approved		AP	Date	11/11/16	Contract No:
	Bowes Street, Manchester					PSL16/5056
						Client Ref:
						4800177423

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

PSL
Professional Soils Laboratory

Checked / Approved		Date	11/11/16	Contract No:
Bowes Street, Manchester				PSL16/5056
				Client Ref:
				4800177423

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m ³ Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
TP201		D	1.00		24			40	18	22	98	Intermediate plasticity CI.
TP201		B	2.20				2.64					
TP202		D	1.00		20			39	19	20	84	Intermediate plasticity CI.
TP202		B	2.00				2.62					
TP203		B	0.50				2.59					
TP204		B	2.00				2.62					
TP210		D	0.50		16			27	15	12	97	Low plasticity CL.
TP211		B	0.20				2.61					
TP212		D	1.00		20			33	15	18	94	Low plasticity CL.
TP213		D	2.00		12			28	13	15	94	Low plasticity CL.
TP214		D	2.10		24			38	18	20	94	Intermediate plasticity CI.
TP217		D	0.50		23			45	20	25	98	Intermediate plasticity CI.
TP217		B	0.20				2.64					
TP219		D	3.00		12			34	16	18	95	Low plasticity CL.
TP220		B	0.20				2.63					
TP223		D	2.20		16			43	19	24	97	Intermediate plasticity CI.
TP224		B	0.60				2.65					
TP226		D	2.00		21			44	18	26	92	Intermediate plasticity CI.
TP227		D	0.50		24			48	20	28	97	Intermediate plasticity CI.

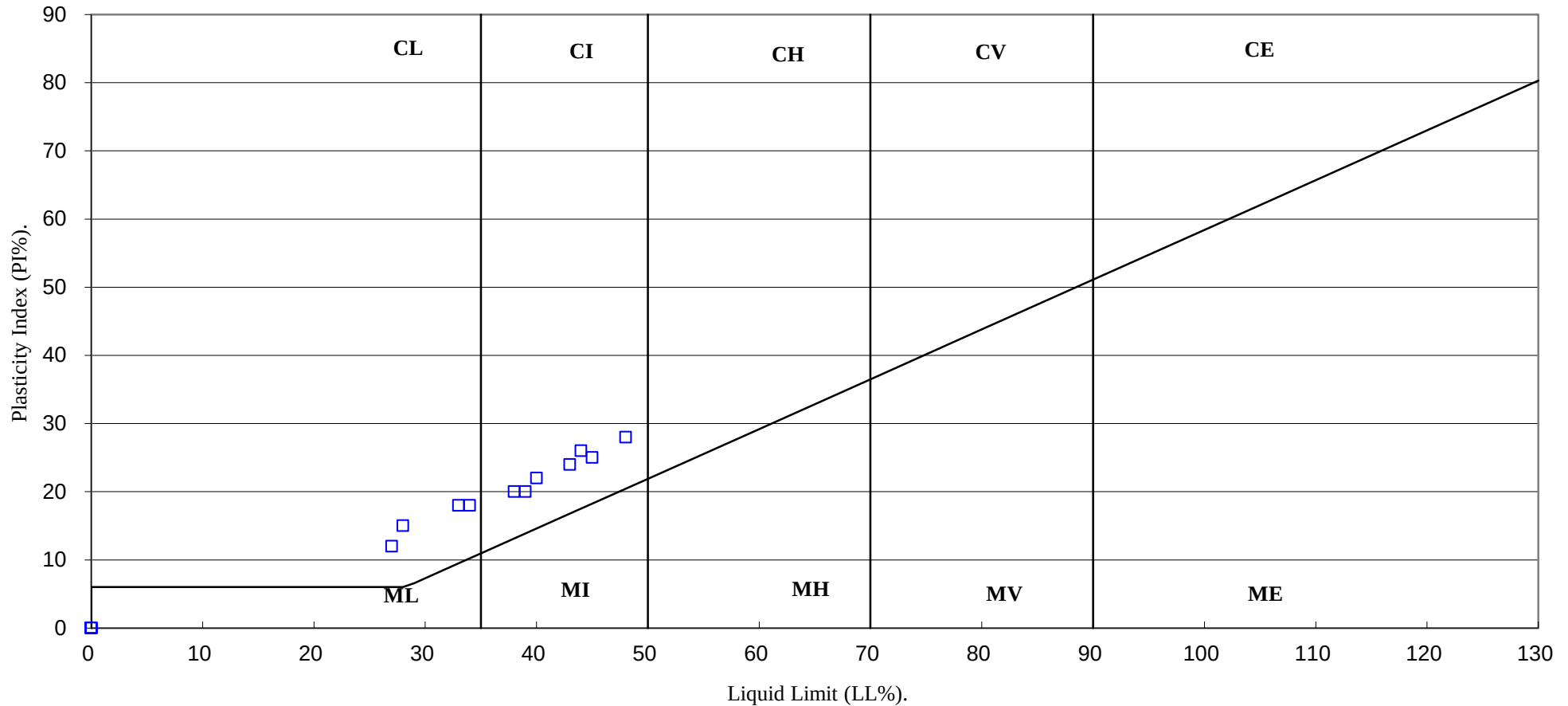
SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.

		Checked / Approved	AR	Date	11/11/16	Contract No:
		Bowes Street, Manchester				PSL16/5056
						Client Ref:
						4800177423

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



PSL
Professional Soils Laboratory

Checked /Approved

AR

Date

11/11/16

Contract No:

PSL16/5056

Client Ref:

4800177423

Bowes Street, Manchester

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



PSL
Professional Soils Laboratory

Checked / Approved

AR

Date _____

11/11/16

Contract No:

PSL16/5056

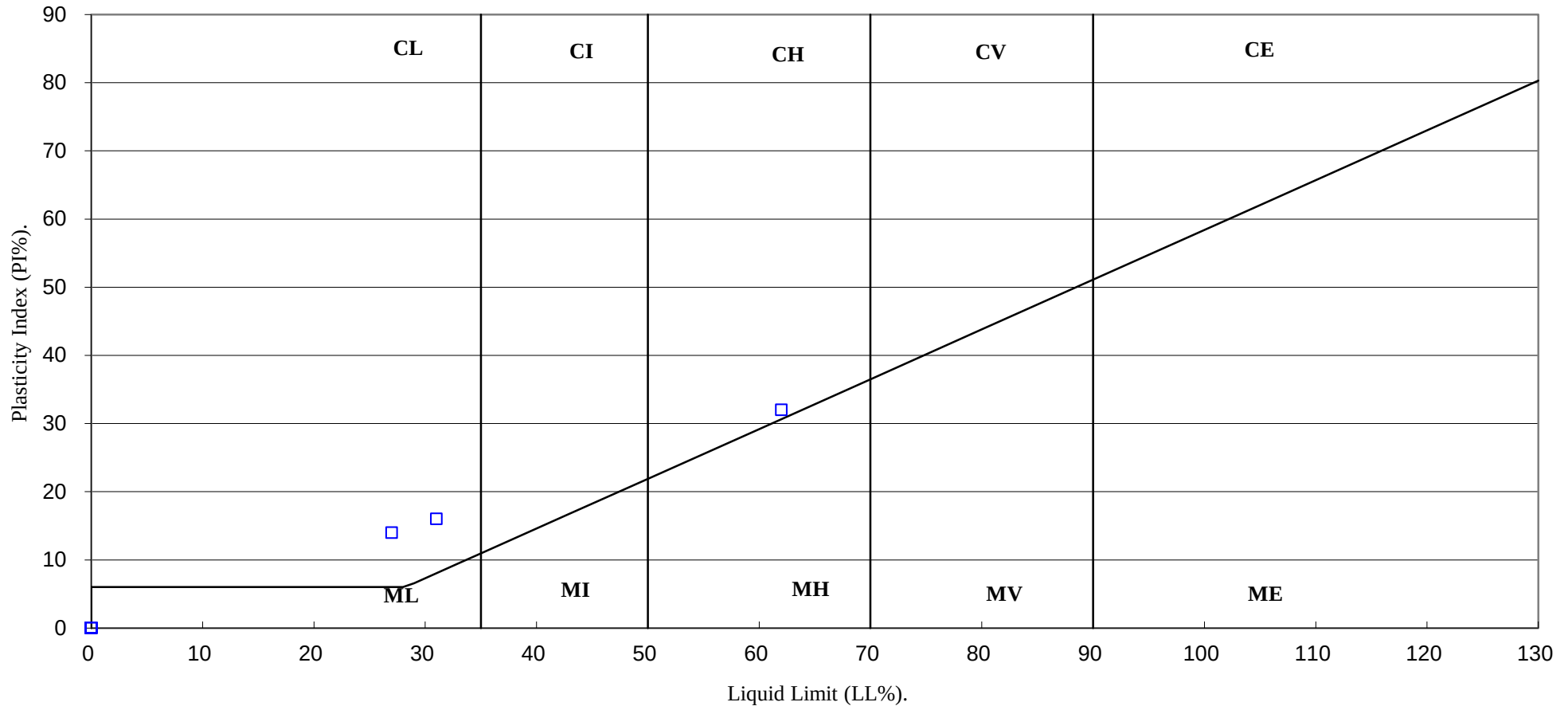
Client Ref:

4800177423

Bowes Street, Manchester

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



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AR

Date

11/11/16

Contract No:

PSL16/5056

Client Ref:

4800177423

Bowes Street, Manchester

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

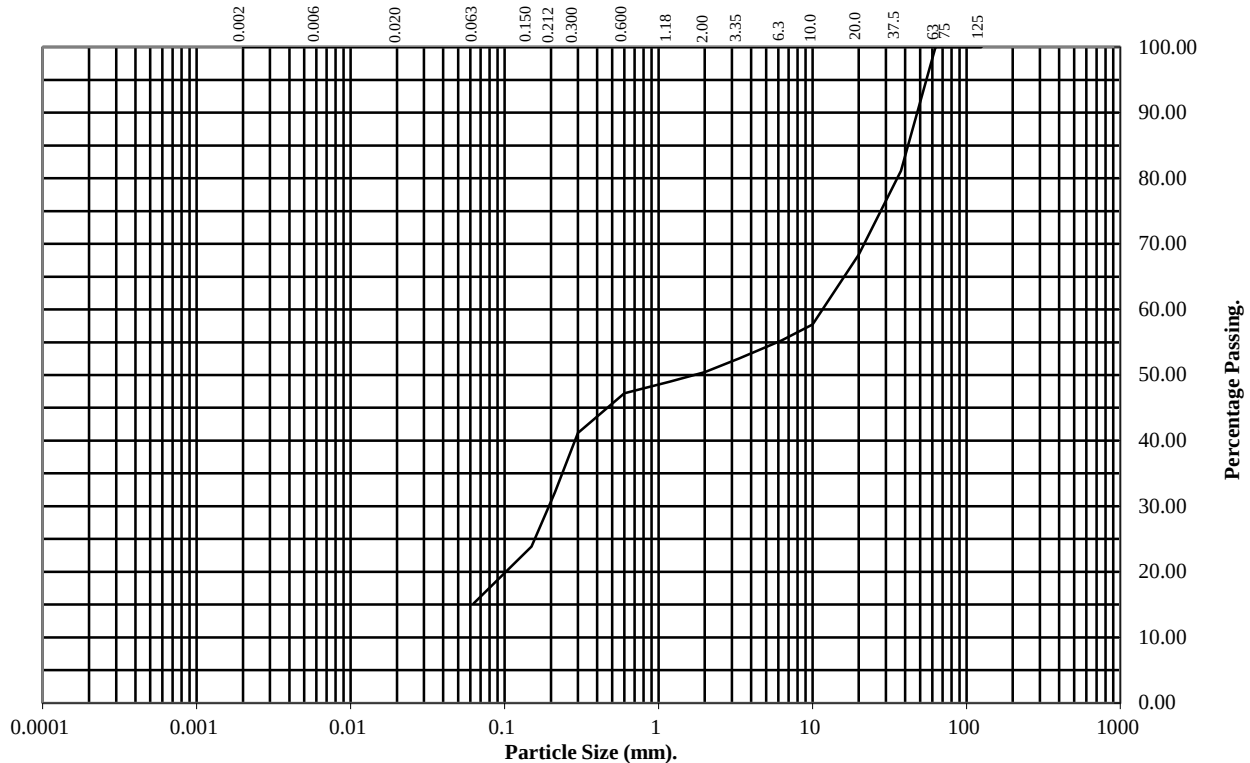
Hole Number: TP201

Top Depth (m): 2.20

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	81
20	68
10	58
6.3	55
3.35	53
2	50
1.18	49
0.6	47
0.3	41
0.212	32
0.15	24
0.063	15

Soil Fraction	Total Percentage
Cobbles	0
Gravel	50
Sand	35
Silt/Clay	15

Remarks:

See summary of soil descriptions.



Checked / Approved	<i>AP</i>	Date	11/11/16	Contract No:
Bowes Street, Manchester				PSL16/5056
				Client Ref:
				4800177423

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

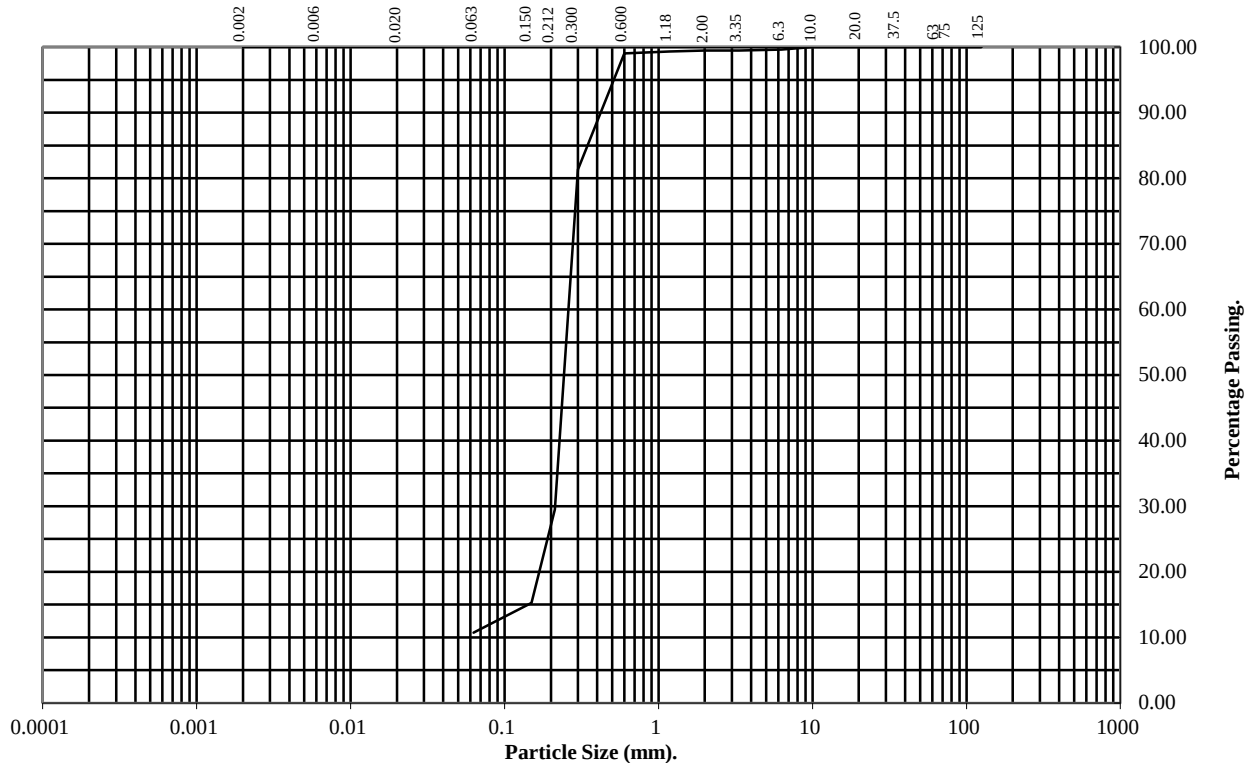
Hole Number: TP202

Top Depth (m): 2.00

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	99
1.18	99
0.6	99
0.3	81
0.212	30
0.15	15
0.063	11

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	88
Silt/Clay	11

Remarks:

See summary of soil descriptions.



Checked / Approved	AP	Date	11/11/16	Contract No:
Bowes Street, Manchester				PSL16/5056
				Client Ref:
				4800177423

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

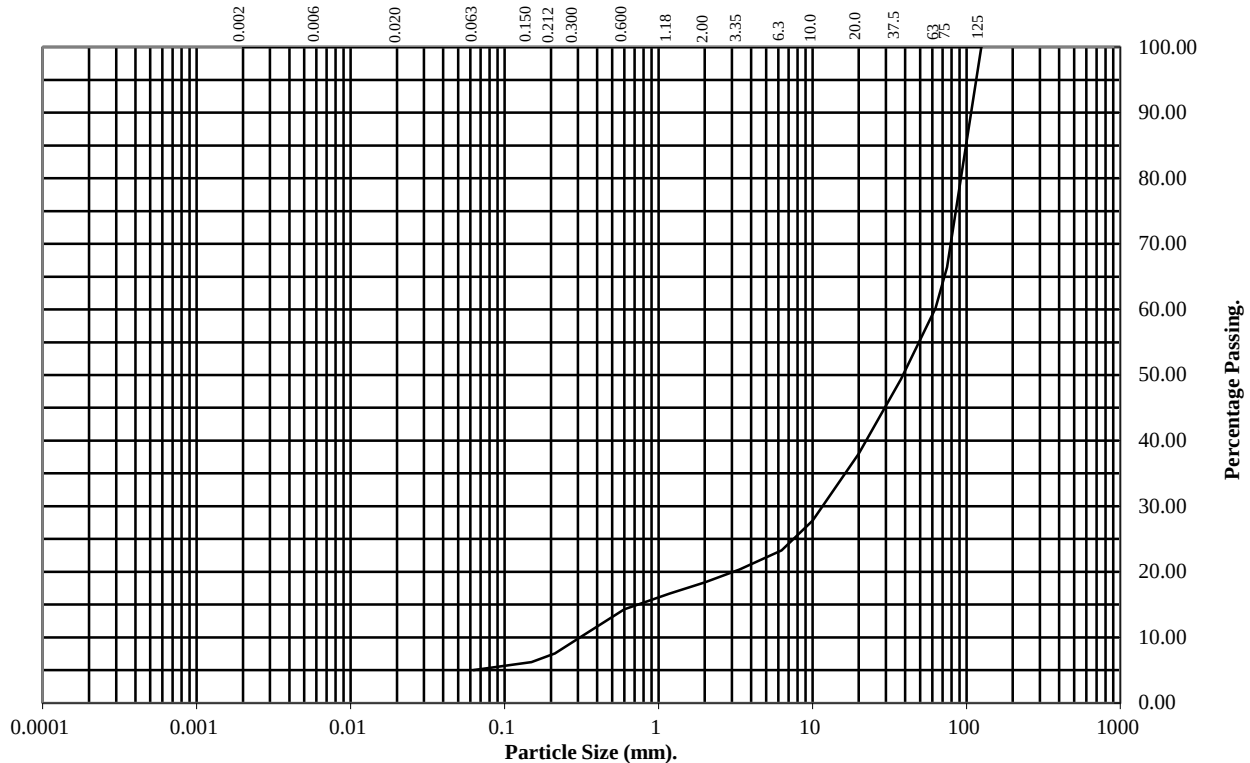
Hole Number: TP203

Top Depth (m): 0.50

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	66
63	60
37.5	49
20	38
10	28
6.3	23
3.35	20
2	18
1.18	17
0.6	14
0.3	10
0.212	8
0.15	6
0.063	5

Soil Fraction	Total Percentage
Cobbles	40
Gravel	42
Sand	13
Silt/Clay	5

Remarks:

See summary of soil descriptions.



Checked / Approved	<i>AP</i>	Date	11/11/16	Contract No:
Bowes Street, Manchester				PSL16/5056
				Client Ref:
				4800177423

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

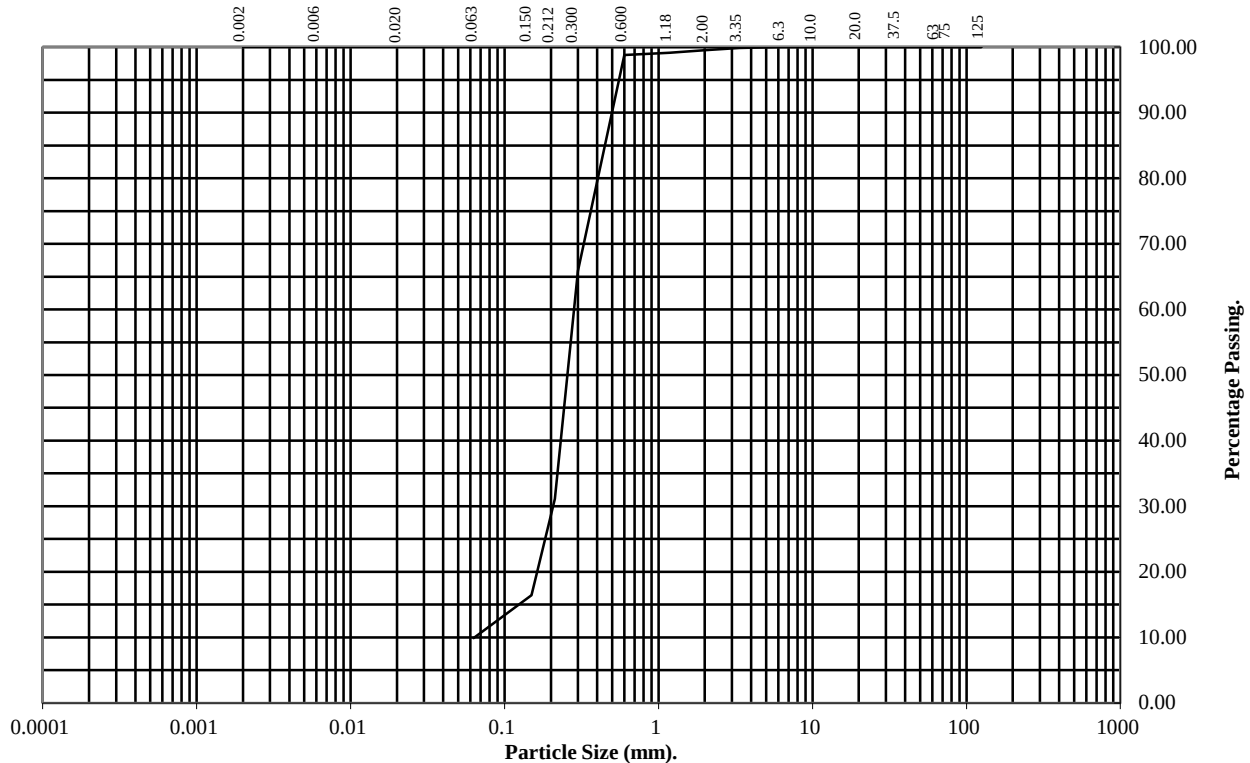
Hole Number: TP204

Top Depth (m): 2.00

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	99
0.6	99
0.3	66
0.212	31
0.15	16
0.063	10

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	90
Silt/Clay	10

Remarks:

See summary of soil descriptions.



Checked / Approved	AP	Date	11/11/16	Contract No:
Bowes Street, Manchester				PSL16/5056
				Client Ref:
				4800177423

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

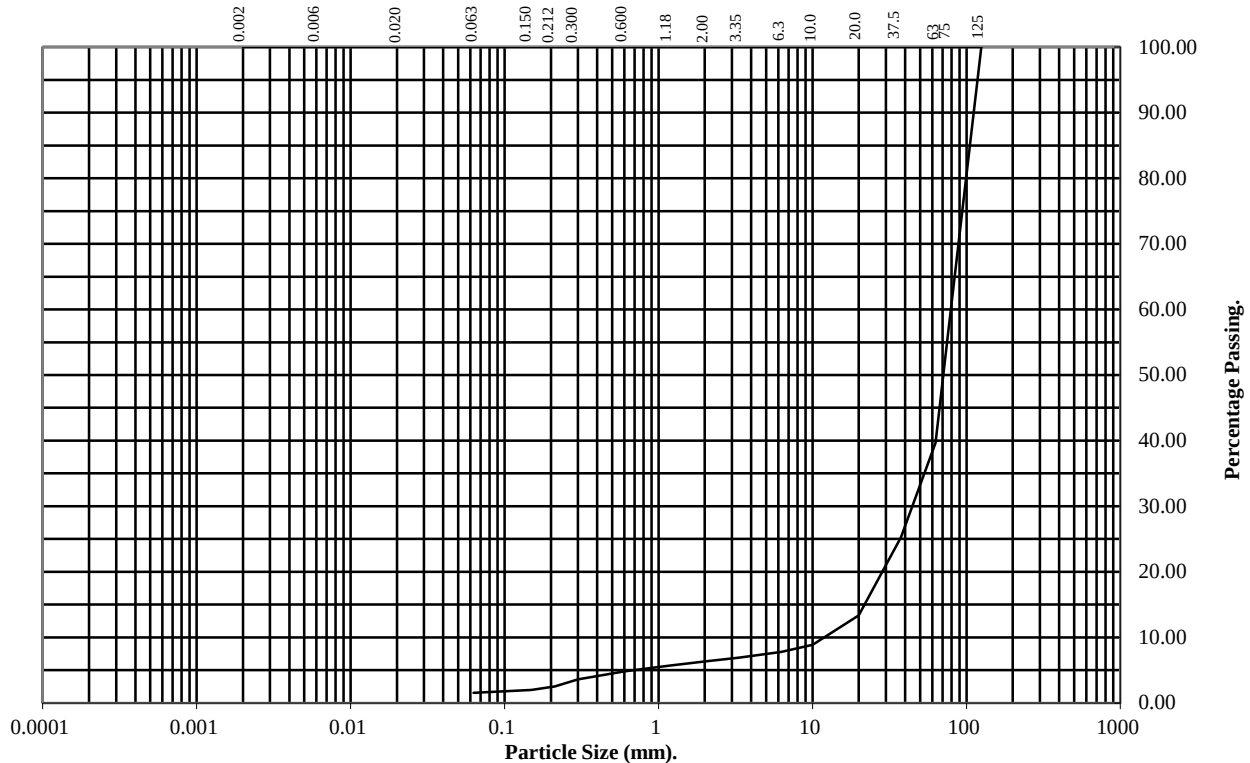
Hole Number: TP211

Top Depth (m): 0.20

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	55
63	40
37.5	25
20	13
10	9
6.3	8
3.35	7
2	6
1.18	6
0.6	5
0.3	4
0.212	3
0.15	2
0.063	2

Soil Fraction	Total Percentage
Cobbles	60
Gravel	34
Sand	4
Silt/Clay	2

Remarks:

See summary of soil descriptions.



Checked / Approved	<i>AP</i>	Date	11/11/16	Contract No:
Bowes Street, Manchester				PSL16/5056
				Client Ref:
				4800177423

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

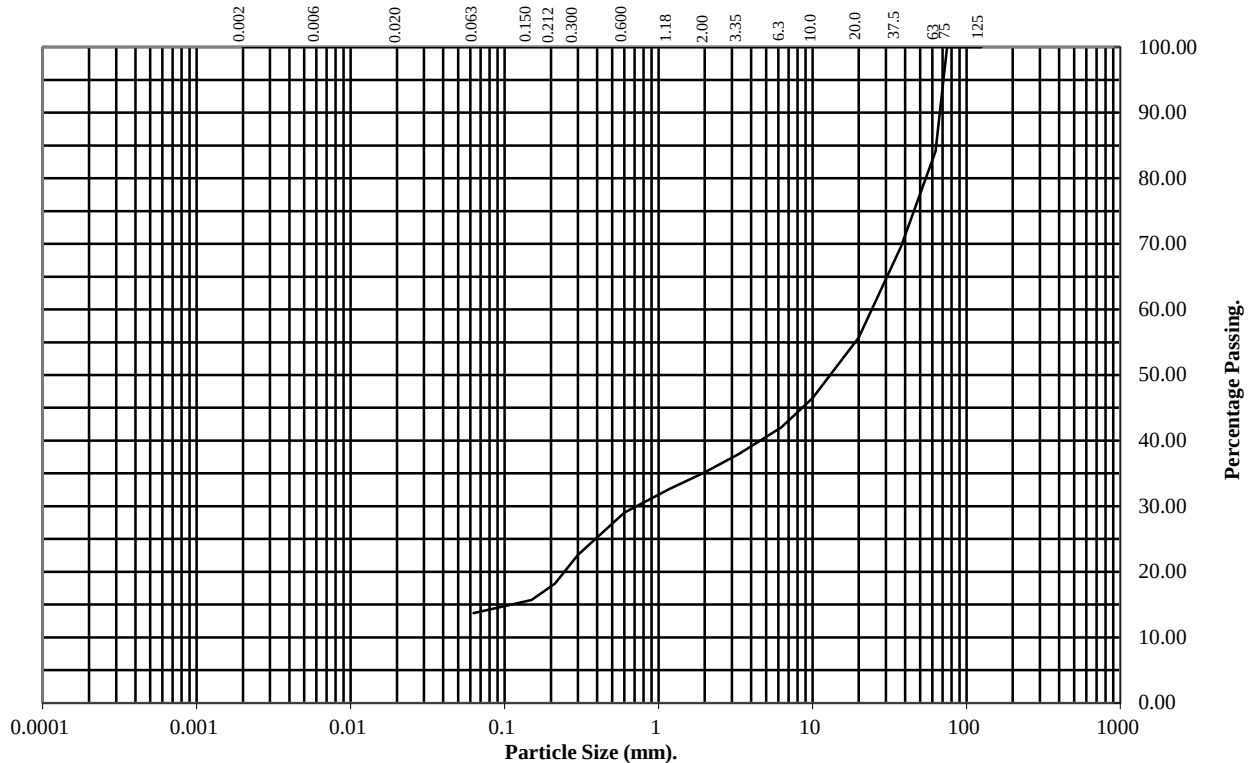
Hole Number: TP217

Top Depth (m): 0.20

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	100
63	84
37.5	70
20	56
10	46
6.3	42
3.35	38
2	35
1.18	33
0.6	29
0.3	23
0.212	18
0.15	16
0.063	14

Soil Fraction	Total Percentage
Cobbles	16
Gravel	49
Sand	21
Silt/Clay	14

Remarks:

See summary of soil descriptions.



Checked / Approved	<i>AP</i>	Date	11/11/16	Contract No:
Bowes Street, Manchester				PSL16/5056
				Client Ref:
				4800177423

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

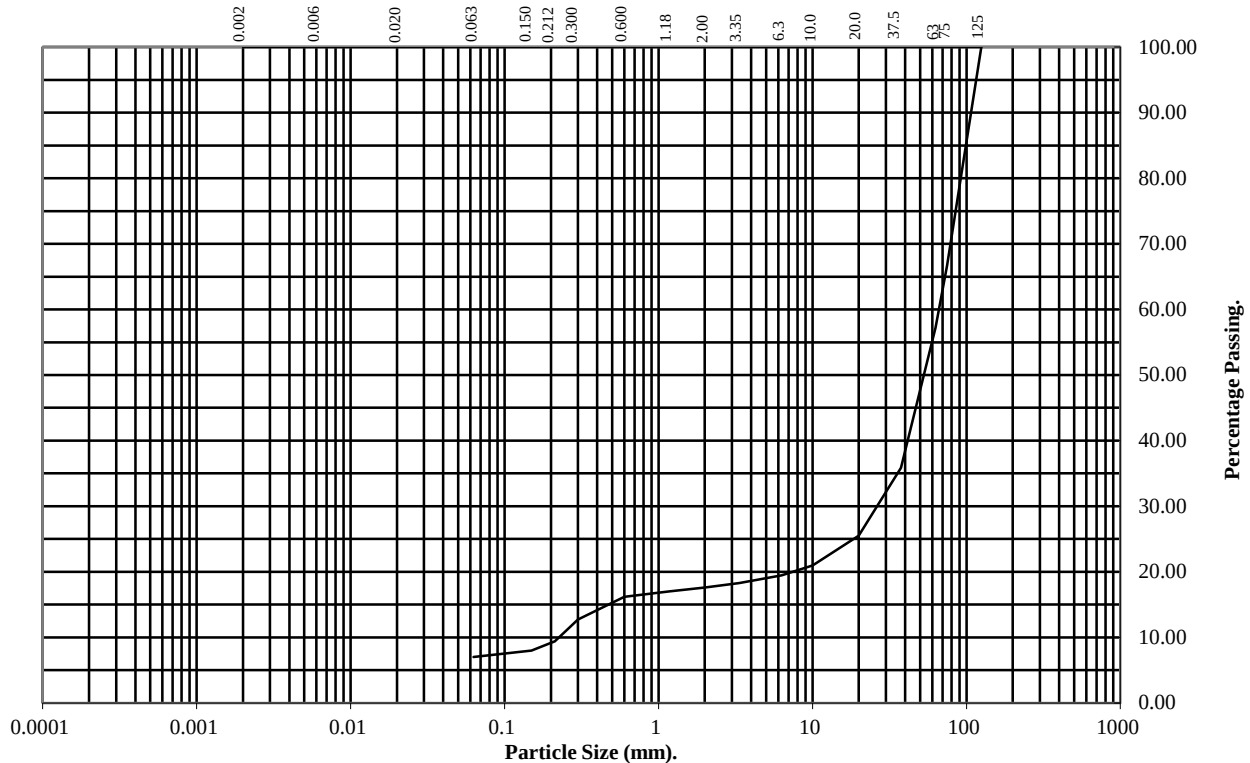
Hole Number: TP220

Top Depth (m): 0.20

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	67
63	57
37.5	36
20	25
10	21
6.3	19
3.35	18
2	18
1.18	17
0.6	16
0.3	13
0.212	9
0.15	8
0.063	7

Soil Fraction	Total Percentage
Cobbles	43
Gravel	39
Sand	11
Silt/Clay	7

Remarks:

See summary of soil descriptions.



Checked / Approved	<i>AP</i>	Date	11/11/16	Contract No:
Bowes Street, Manchester				PSL16/5056
				Client Ref:
				4800177423

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

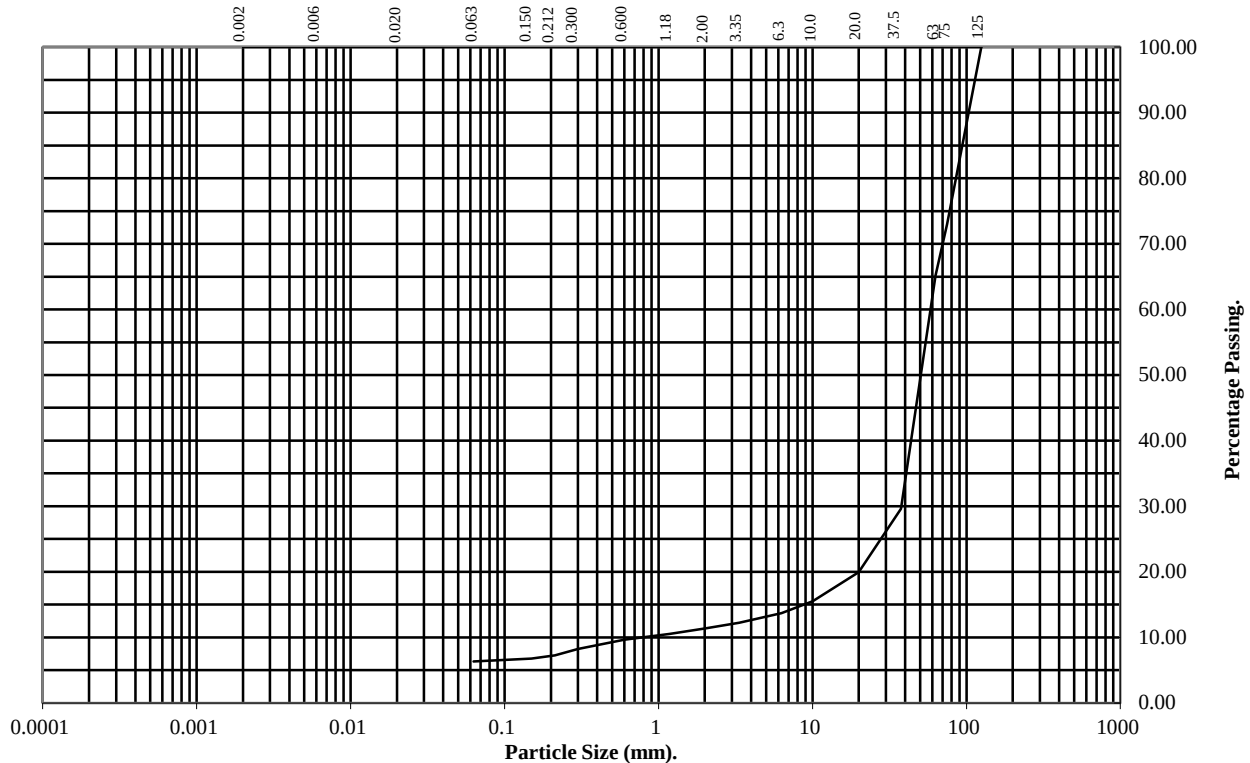
Hole Number: TP224

Top Depth (m): 0.60

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	73
63	65
37.5	30
20	20
10	15
6.3	14
3.35	12
2	11
1.18	11
0.6	10
0.3	8
0.212	7
0.15	7
0.063	6

Soil Fraction	Total Percentage
Cobbles	35
Gravel	54
Sand	5
Silt/Clay	6

Remarks:

See summary of soil descriptions.



Checked / Approved	<i>AP</i>	Date	11/11/16	Contract No:
Bowes Street, Manchester				PSL16/5056
				Client Ref:
				4800177423

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

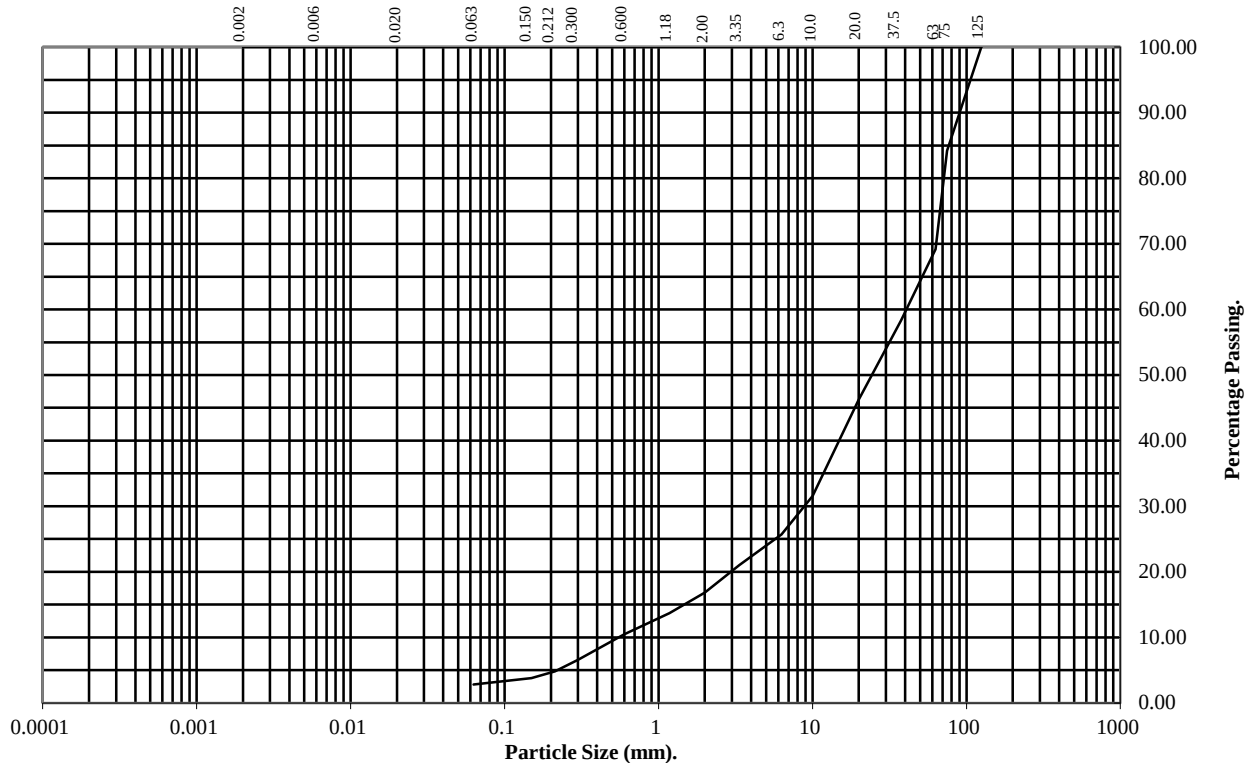
Hole Number: TP230

Top Depth (m): 0.10

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	84
63	69
37.5	58
20	46
10	32
6.3	26
3.35	21
2	17
1.18	14
0.6	10
0.3	7
0.212	5
0.15	4
0.063	3

Soil Fraction	Total Percentage
Cobbles	31
Gravel	52
Sand	14
Silt/Clay	3

Remarks:

See summary of soil descriptions.



Checked / Approved	<i>AP</i>	Date	11/11/16	Contract No:
Bowes Street, Manchester				PSL16/5056
				Client Ref:
				4800177423

Appendix D SAL Environmental Report

Scientific Analysis Laboratories Ltd

Certificate of Analysis

Report Number: 609132-1

Date of Report: 02-Nov-2016

Customer: Capita Property and Infrastructure Ltd
Clemence House
9 Mellor Road
Cheadle Hulme
Cheshire.
SK8 5AT

Customer Contact: Mr Andrew Watts

Customer Job Reference: CS088198
Customer Purchase Order: 4800177433
Customer Site Reference: Bowes Street
Date Job Received at SAL: 19-Oct-2016
Date Analysis Started: 24-Oct-2016
Date Analysis Completed: 01-Nov-2016

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with SAL SOPs

All results have been reviewed in accordance with Section 25 of the SAL Quality Manual



Report checked
and authorised by :
Sara Abou-Shakra
Project Manager

Issued by :
Sara Abou-Shakra
Project Manager



SAL Reference: 609132 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil Heavy Metals(9)									
SAL Reference					609132 031	609132 032	609132 033	609132 034	609132 035
Customer Sample Reference					BH202	BH203	BH204	BH205	BH206
Bottom Depth					0.5	1.2	0.3	1.0	0.5
Date Sampled					19-OCT-2016	18-OCT-2016	18-OCT-2016	18-OCT-2016	19-OCT-2016
Type					Clay	Sandy Soil	Sandy Soil	Clay	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Arsenic	T6	M40	2	mg/kg	5	8	9	7	7
Cadmium	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	13	16	18	36	19
Copper	T6	M40	1	mg/kg	17	26	27	27	31
Lead	T6	M40	1	mg/kg	88	160	170	29	160
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	12	16	14	38	14
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3
Zinc	T6	M40	1	mg/kg	82	83	150	74	230

SAL Reference: 609132 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil Heavy Metals(9)					
SAL Reference					609132 036
Customer Sample Reference					BH206
Bottom Depth					1.4
Date Sampled					19-OCT-2016
Type					Sandy Soil
Determinand	Method	Test Sample	LOD	Units	
Arsenic	T6	M40	2	mg/kg	15
Cadmium	T6	M40	1	mg/kg	<1
Chromium	T6	M40	1	mg/kg	28
Copper	T6	M40	1	mg/kg	57
Lead	T6	M40	1	mg/kg	200
Mercury	T6	M40	1	mg/kg	<1
Nickel	T6	M40	1	mg/kg	26
Selenium	T6	M40	3	mg/kg	<3
Zinc	T6	M40	1	mg/kg	100

SAL Reference: 609132 Project Site: Bowes Street Customer Reference: CS088198									
Soil					Analysed as Soil				
Capita Suite A									
SAL Reference					609132 001	609132 002	609132 003	609132 004	609132 005
Customer Sample Reference					TP201	TP201	TP202	TP203	TP204
Bottom Depth					2.2	2.6	0.05	1.1	0.8
Date Sampled					18-OCT-2016	18-OCT-2016	18-OCT-2016	18-OCT-2016	18-OCT-2016
Type					Sandy Soil	Sandy Soil	Sandy Soil	Clay	Clay
Determinand	Method	Test Sample	LOD	Units					
Asbestos ID	T27	AR			N.D.	N.D.	N.D.	N.D.	N.D.
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Cyanide(Total)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
pH	T7	AR			7.2	7.4	8.6	7.8	7.9
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
Soil Organic Matter	T287	AR	0.1	%	0.1	<0.1	0.2	0.7	0.5
SO4(Total)	T6	A40	0.01	%	0.01	0.01	0.01	0.09	0.04
SO4(2:1)	T6	AR	0.1	g/l	<0.1	<0.1	<0.1	0.1	<0.1
Sulphide	T4	AR	10	mg/kg	<10	<10	<10	<10	<10
Sulphur (total)	T6	A40	0.01	%	<0.01	<0.01	<0.01	0.03	0.01
Vanadium	T6	M40	1	mg/kg	11	10	10	21	17

SAL Reference: 609132									
Project Site: Bowes Street									
Customer Reference: CS088198									
Soil		Analysed as Soil							
Capita Suite A									
SAL Reference					609132 006	609132 007	609132 008	609132 009	609132 010
Customer Sample Reference					TP204	TP205	TP205	TP206	TP208
Bottom Depth					1.0	1.4	2.15	0.5	2.0
Date Sampled					18-OCT-2016	18-OCT-2016	18-OCT-2016	18-OCT-2016	18-OCT-2016
Type					Clay	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Asbestos ID	T27	AR			-	N.D.	-	N.D.	N.D.
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Cyanide(Total)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
pH	T7	AR			6.0	7.1	7.5	9.5	8.3
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
Soil Organic Matter	T287	AR	0.1	%	0.5	0.7	0.1	0.9	<0.1
SO4(Total)	T6	A40	0.01	%	0.06	0.07	0.05	0.04	0.02
SO4(2:1)	T6	AR	0.1	g/l	<0.1	<0.1	<0.1	<0.1	<0.1
Sulphide	T4	AR	10	mg/kg	<10	<10	<10	<10	<10
Sulphur (total)	T6	A40	0.01	%	0.02	0.02	0.01	0.01	0.01
Vanadium	T6	M40	1	mg/kg	27	16	17	13	8

SAL Reference: 609132									
Project Site: Bowes Street									
Customer Reference: CS088198									
Soil					Analysed as Soil				
Capita Suite A									
SAL Reference					609132 031	609132 032	609132 033	609132 034	609132 035
Customer Sample Reference					BH202	BH203	BH204	BH205	BH206
Bottom Depth					0.5	1.2	0.3	1.0	0.5
Date Sampled					19-OCT-2016	18-OCT-2016	18-OCT-2016	18-OCT-2016	19-OCT-2016
Type					Clay	Sandy Soil	Sandy Soil	Clay	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Asbestos ID	T27	AR			N.D.	N.D.	N.D.	-	N.D.
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Cyanide(Total)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
pH	T7	AR			10.9	11.1	9.6	8.2	10.1
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
Soil Organic Matter	T287	AR	0.1	%	1.6	3.5	2.7	0.9	4.4
SO4(Total)	T6	A40	0.01	%	0.18	0.27	0.22	0.08	0.89
SO4(2:1)	T6	AR	0.1	g/l	<0.1	<0.1	<0.1	<0.1	<0.1
Sulphide	T4	AR	10	mg/kg	<10	56	<10	<10	<10
Sulphur (total)	T6	A40	0.01	%	0.07	0.11	0.08	0.03	0.29
Vanadium	T6	M40	1	mg/kg	19	22	26	36	25

SAL Reference: 609132 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil Capita Suite A					
SAL Reference		609132 036			
Customer Sample Reference		BH206			
Bottom Depth		1.4			
Date Sampled		19-OCT-2016			
Type		Sandy Soil			
Determinand	Method	Test Sample	LOD	Units	
Asbestos ID	T27	AR			N.D.
Boron (water-soluble)	T6	AR	1	mg/kg	<1
Chromium VI	T6	AR	1	mg/kg	<1
Cyanide(Total)	T546	AR	1	mg/kg	<1
pH	T7	AR			6.9
Phenols(Mono)	T546	AR	1	mg/kg	<1
Retained on 10mm sieve	T2	M40	0.1	%	<0.1
Soil Organic Matter	T287	AR	0.1	%	4.1
SO4(Total)	T6	A40	0.01	%	0.16
SO4(2:1)	T6	AR	0.1	g/l	<0.1
Sulphide	T4	AR	10	mg/kg	<10
Sulphur (total)	T6	A40	0.01	%	0.07
Vanadium	T6	M40	1	mg/kg	35

Soil	Analysed as Soil
Capita Suite B	

SAL Reference: 609132 Project Site: Bowes Street Customer Reference: CS088198					
Soil Capita Suite B			Analysed as Soil		
SAL Reference					609132 036
Customer Sample Reference					BH206
Bottom Depth					1.4
Date Sampled					19-OCT-2016
Type					Sandy Soil
Determinand	Method	Test Sample	LOD	Units	
Boron (water-soluble)	T6	AR	1	mg/kg	<1
Chromium VI	T6	AR	1	mg/kg	<1
Cyanide(Total)	T546	AR	1	mg/kg	<1
pH	T7	AR			6.9
Phenols(Mono)	T546	AR	1	mg/kg	<1
Soil Organic Matter	T287	AR	0.1	%	4.1
SO4(Total)	T6	A40	0.01	%	0.16
SO4(2:1)	T6	AR	0.1	g/l	<0.1
Sulphide	T4	AR	10	mg/kg	<10
Sulphur (total)	T6	A40	0.01	%	0.07
Vanadium	T6	M40	1	mg/kg	35

Project Site: Bowes Street
Customer Reference: CS088198

Soil	Analysed as Soil
Volatile Organic Compounds (USEPA 624) (MCERTS)	

Produced by Scientific Analysis Laboratories Ltd, Hadfield House, Hadfield Street, Cornbrook, Manchester, M16 9FE

SAL Reference: 609132 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil PCB EC7						
SAL Reference				609132 023	609132 027	
Customer Sample Reference				TP221	TP227	
Bottom Depth				0.3	1.8	
Date Sampled				19-OCT-2016	20-OCT-2016	
Type				Sandy Soil	Clay	
Determinand	Method	Test Sample	LOD	Units		
PCB BZ#28	T208	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#52	T208	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#101	T208	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#118	T208	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#153	T208	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#138	T208	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#180	T208	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05

SAL Reference: 609132 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil Poly-Chlorinated Biphenyls (WHO 12)						
SAL Reference				609132 023	609132 027	
Customer Sample Reference				TP221	TP227	
Bottom Depth				0.3	1.8	
Date Sampled				19-OCT-2016	20-OCT-2016	
Type				Sandy Soil	Clay	
Determinand	Method	Test Sample	LOD	Units		
PCB BZ#77	T1	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#81	T1	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#105	T1	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#114	T1	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#118	T1	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#123	T1	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#126	T1	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#156	T1	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#157	T1	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#167	T1	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#169	T1	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05
PCB BZ#189	T1	M105	0.05	µg/kg	⁽²⁾ <0.10	<0.05

SAL Reference: 609132 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil PAH US EPA 16 (B and K split)									
SAL Reference					609132 001	609132 002	609132 003	609132 004	609132 005
Customer Sample Reference					TP201	TP201	TP202	TP203	TP204
Bottom Depth					2.2	2.6	0.05	1.1	0.8
Date Sampled					18-OCT-2016	18-OCT-2016	18-OCT-2016	18-OCT-2016	18-OCT-2016
Type					Sandy Soil	Sandy Soil	Sandy Soil	Clay	Clay
Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	0.8
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	0.2
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	0.2	2.3
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	0.1	2.4
Phenanthrene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.2	1.1	14
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	0.3	5.1
Fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.3	1.0	11
Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.3	0.9	10
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.1	0.4	8.2
Chrysene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.1	0.4	6.8
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.1	0.4	6.9
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	0.1	4.2
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	0.3	6.8
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	0.1	3.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	1.0
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	0.2	3.3
PAH(total)	T207	M105	0.1	mg/kg	<0.1	<0.1	1.1	5.5	86

SAL Reference: 609132 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil PAH US EPA 16 (B and K split)									
SAL Reference					609132 006	609132 007	609132 008	609132 009	609132 010
Customer Sample Reference					TP204	TP205	TP205	TP206	TP208
Bottom Depth					1.0	1.4	2.15	0.5	2.0
Date Sampled					18-OCT-2016	18-OCT-2016	18-OCT-2016	18-OCT-2016	18-OCT-2016
Type					Clay	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T207	M105	0.1	mg/kg	<0.1	0.3	<0.1	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1	0.3	0.3	0.3	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	<0.1	0.5	0.4	0.5	<0.1
Pyrene	T207	M105	0.1	mg/kg	<0.1	0.4	0.4	0.5	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	0.2	0.2	0.2	<0.1
Chrysene	T207	M105	0.1	mg/kg	<0.1	0.2	0.2	0.2	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1	0.2	0.2	0.3	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1	0.1	<0.1	0.1	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	0.2	0.2	0.2	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	0.2	<0.1
PAH(total)	T207	M105	0.1	mg/kg	<0.1	2.5	1.9	2.7	<0.1

SAL Reference: 609132 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil PAH US EPA 16 (B and K split)									
SAL Reference					609132 011	609132 012	609132 013	609132 014	609132 015
Customer Sample Reference					TP209	TP210	TP211	TP212	TP213
Bottom Depth					1.8	2.7	0.05	2.5	1.0
Date Sampled					18-OCT-2016	19-OCT-2016	19-OCT-2016	18-OCT-2016	18-OCT-2016
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Clay
Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1
Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
PAH(total)	T207	M105	0.1	mg/kg	<0.1	<0.1	0.5	<0.1	<0.1

SAL Reference: 609132 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil PAH US EPA 16 (B and K split)									
SAL Reference					609132 016	609132 017	609132 018	609132 019	609132 020
Customer Sample Reference					TP214	TP214	TP215	TP216	TP217
Bottom Depth					2.1	4.2	0.7	0.6	0.5
Date Sampled					18-OCT-2016	18-OCT-2016	19-OCT-2016	19-OCT-2016	19-OCT-2016
Type					Clay	Clay	Clay	Sandy Soil	Clay
Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T207	M105	0.1	mg/kg	0.1	9.1	1.1	0.2	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	⁽¹⁰⁰⁾ <1.0	0.2	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	0.4	2.3	0.8	0.5	<0.1
Fluorene	T207	M105	0.1	mg/kg	0.3	3.3	0.9	0.4	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	2.2	7.4	4.3	2.9	<0.1
Anthracene	T207	M105	0.1	mg/kg	0.5	1.3	1.2	0.8	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	1.8	3.9	3.9	3.2	0.2
Pyrene	T207	M105	0.1	mg/kg	1.7	4.0	3.8	3.4	0.2
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	0.7	1.4	1.8	1.6	<0.1
Chrysene	T207	M105	0.1	mg/kg	0.9	1.7	2.0	2.0	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	0.4	⁽¹⁰⁰⁾ <1.0	1.3	1.3	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	0.4	⁽¹⁰⁰⁾ <1.0	1.1	0.8	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	0.5	⁽¹⁰⁰⁾ <1.0	1.5	1.3	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	0.3	⁽¹⁰⁰⁾ <1.0	0.9	0.8	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	⁽¹⁰⁰⁾ <1.0	0.3	0.3	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	0.3	⁽¹⁰⁰⁾ <1.0	1.1	1.0	<0.1
PAH(total)	T207	M105	0.1	mg/kg	11	34	26	21	0.3

SAL Reference: 609132 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil PAH US EPA 16 (B and K split)									
SAL Reference				609132 021	609132 022	609132 023	609132 024	609132 025	
Customer Sample Reference				TP218	TP220	TP221	TP224	TP224	
Bottom Depth				0.7	1.0	0.3	0.4	1.8	
Date Sampled				19-OCT-2016	19-OCT-2016	19-OCT-2016	20-OCT-2016	20-OCT-2016	
Type				Sandy Soil	Clay	Sandy Soil	Sandy Soil	Clay	
Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T207	M105	0.1	mg/kg	1.8	12	1.1	3.7	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	⁽⁹⁾ <1.0	5.2	<0.1	⁽⁹⁾ <1.0	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	2.7	36	1.2	10	<0.1
Fluorene	T207	M105	0.1	mg/kg	1.8	30	0.8	5.8	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	13	250	5.3	44	<0.1
Anthracene	T207	M105	0.1	mg/kg	2.8	67	1.5	11	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	9.7	240	5.1	32	<0.1
Pyrene	T207	M105	0.1	mg/kg	9.3	230	5.3	31	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	3.7	120	3.2	13	<0.1
Chrysene	T207	M105	0.1	mg/kg	4.7	130	3.8	17	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	2.4	78	2.7	7.4	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	2.0	60	1.5	8.1	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	2.7	80	2.8	10	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	1.6	40	1.7	5.2	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	⁽⁹⁾ <1.0	16	0.6	1.7	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	2.0	44	2.0	6.2	<0.1
PAH(total)	T207	M105	0.1	mg/kg	60	1400	39	210	<0.1

SAL Reference: 609132 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil PAH US EPA 16 (B and K split)									
SAL Reference				609132 026	609132 027	609132 028	609132 029	609132 030	
Customer Sample Reference				TP225	TP227	TP229	TP229	TP230	
Bottom Depth				1.0	1.8	0.35	1.1	1.8	
Date Sampled				20-OCT-2016	20-OCT-2016	20-OCT-2016	20-OCT-2016	20-OCT-2016	
Type				Sandy Soil	Clay	Sandy Soil	Clay	Clay	
Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T207	M105	0.1	mg/kg	6.5	0.2	⁽⁹⁾ <1.0	2.6	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	1.9	<0.1	⁽⁹⁾ <1.0	⁽⁹⁾ <1.0	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	25	0.2	7.6	6.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	16	0.2	4.4	4.4	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	120	1.5	42	32	0.4
Anthracene	T207	M105	0.1	mg/kg	27	0.3	11	7.5	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	92	1.7	34	26	0.4
Pyrene	T207	M105	0.1	mg/kg	88	1.7	32	24	0.4
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	46	0.8	14	11	0.2
Chrysene	T207	M105	0.1	mg/kg	58	0.9	18	14	0.2
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	30	0.5	9.1	6.3	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	27	0.5	7.7	7.0	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	35	0.6	10	8.1	0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	19	0.4	5.9	4.6	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	6.1	0.1	1.8	1.4	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	21	0.4	6.9	5.4	<0.1
PAH(total)	T207	M105	0.1	mg/kg	610	9.9	200	160	1.7

SAL Reference: 609132 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil PAH US EPA 16 (B and K split)									
SAL Reference					609132 031	609132 032	609132 033	609132 034	609132 035
Customer Sample Reference					BH202	BH203	BH204	BH205	BH206
Bottom Depth					0.5	1.2	0.3	1.0	0.5
Date Sampled					19-OCT-2016	18-OCT-2016	18-OCT-2016	18-OCT-2016	19-OCT-2016
Type					Clay	Sandy Soil	Sandy Soil	Clay	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T207	M105	0.1	mg/kg	0.3	3.0	1.0	<0.1	⁽⁹⁾ <1.0
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	⁽⁹⁾ <1.0	⁽⁹⁾ <1.0	<0.1	⁽⁹⁾ <1.0
Acenaphthene	T207	M105	0.1	mg/kg	0.4	6.8	3.0	<0.1	⁽⁹⁾ <1.0
Fluorene	T207	M105	0.1	mg/kg	0.3	5.4	1.9	<0.1	⁽⁹⁾ <1.0
Phenanthrene	T207	M105	0.1	mg/kg	2.3	29	13	<0.1	6.3
Anthracene	T207	M105	0.1	mg/kg	0.6	5.2	3.1	<0.1	1.2
Fluoranthene	T207	M105	0.1	mg/kg	2.0	18	9.7	0.1	5.6
Pyrene	T207	M105	0.1	mg/kg	1.9	17	9.1	0.1	5.4
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	0.9	6.8	3.5	<0.1	1.7
Chrysene	T207	M105	0.1	mg/kg	1.0	8.5	4.4	<0.1	2.3
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	0.6	4.0	2.4	<0.1	1.2
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	0.4	3.9	2.1	<0.1	1.0
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	0.6	4.6	2.6	<0.1	1.3
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	0.4	2.7	1.6	<0.1	⁽⁹⁾ <1.0
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	0.1	⁽⁹⁾ <1.0	⁽⁹⁾ <1.0	<0.1	⁽⁹⁾ <1.0
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	0.4	3.0	1.8	<0.1	1.1
PAH(total)	T207	M105	0.1	mg/kg	12	120	60	0.3	27

SAL Reference: 609132 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil PAH US EPA 16 (B and K split)					
SAL Reference					609132 036
Customer Sample Reference					BH206
Bottom Depth					1.4
Date Sampled					19-OCT-2016
Type					Sandy Soil
Determinand	Method	Test Sample	LOD	Units	
Naphthalene	T207	M105	0.1	mg/kg	26
Acenaphthylene	T207	M105	0.1	mg/kg	1.1
Acenaphthene	T207	M105	0.1	mg/kg	53
Fluorene	T207	M105	0.1	mg/kg	31
Phenanthrene	T207	M105	0.1	mg/kg	180
Anthracene	T207	M105	0.1	mg/kg	46
Fluoranthene	T207	M105	0.1	mg/kg	120
Pyrene	T207	M105	0.1	mg/kg	120
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	63
Chrysene	T207	M105	0.1	mg/kg	79
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	38
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	38
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	48
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	29
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	9.2
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	33
PAH(total)	T207	M105	0.1	mg/kg	910

SAL Reference: 609132									
Project Site: Bowes Street									
Customer Reference: CS088198									
Soil					Analysed as Soil				
TPH (CWG) with MTBE, BTEX									
SAL Reference					609132 001	609132 002	609132 003	609132 004	609132 005
Customer Sample Reference					TP201	TP201	TP202	TP203	TP204
Bottom Depth					2.2	2.6	0.05	1.1	0.8
Date Sampled					18-OCT-2016	18-OCT-2016	18-OCT-2016	18-OCT-2016	18-OCT-2016
Type					Sandy Soil	Sandy Soil	Sandy Soil	Clay	Clay
Determinand	Method	Test Sample	LOD	Units					
Benzene	T54	AR	1	µg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1
Toluene	T54	AR	1	µg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1
EthylBenzene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
M/P Xylene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
O Xylene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
TPH (C5-C6 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C6-C8 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C8-C10 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	(13) 4	(13) <1	(13) 75	(13) <1	(13) 2
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	(13) 2	(13) <1	(13) 280	(13) <1	(13) 2
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	(13) <2	(13) <2	(13) 27	(13) <2	(13) <2
TPH (C6-C7 aromatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C7-C8 aromatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C8-C10 aromatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	(13) <2	(13) <2	(13) <2	(13) <2	(13) <2
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	(13) 2	(13) <1	(13) 34	(13) 2	(13) 4
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	(13) 5	(13) <1	(13) 110	(13) 7	(13) 14
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	(13) 5	(13) <1	(13) 32	(13) 8	(13) 16

SAL Reference: 609132									
Project Site: Bowes Street									
Customer Reference: CS088198									
Soil					Analysed as Soil				
TPH (CWG) with MTBE, BTEX									
SAL Reference					609132 016	609132 017	609132 018	609132 019	609132 021
Customer Sample Reference					TP214	TP214	TP215	TP216	TP218
Bottom Depth					2.1	4.2	0.7	0.6	0.7
Date Sampled					18-OCT-2016	18-OCT-2016	19-OCT-2016	19-OCT-2016	19-OCT-2016
Type					Clay	Clay	Clay	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Benzene	T54	AR	1	µg/kg	(13) <1	(110,13) <2	(13) <1	(13) <1	(13) <1
Toluene	T54	AR	1	µg/kg	(13) <1	(13) 9	(13) <1	(13) <1	(13) <1
EthylBenzene	T54	AR	1	µg/kg	9	(110) <2	2	4	<1
M/P Xylene	T54	AR	1	µg/kg	12	(175) 1900	3	4	<1
O Xylene	T54	AR	1	µg/kg	8	630	3	3	<1
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	<1	(110) <2	<1	<1	<1
TPH (C5-C6 aliphatic)	T54	AR	10	µg/kg	<10	(110) <20	<10	<10	<10
TPH (C6-C8 aliphatic)	T54	AR	10	µg/kg	<10	3000	<10	<10	<10
TPH (C8-C10 aliphatic)	T54	AR	10	µg/kg	970	36000	<10	<10	<10
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	(13) 48	(13,100) <10	(13) <1	(9,13) <10	(13,9) <10
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	(13) 250	(13) 38	(13) <1	(13) 16	(9,13) <10
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	(13) 130	(13) 59	(13) 1	(13) 25	(13) 11
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	(13) 4	(13) 39	(13) <2	(13) 66	(9,13) <10
TPH (C6-C7 aromatic)	T54	AR	10	µg/kg	<10	(110) <20	<10	<10	<10
TPH (C7-C8 aromatic)	T54	AR	10	µg/kg	<10	(110) <20	<10	<10	<10
TPH (C8-C10 aromatic)	T54	AR	10	µg/kg	410	31000	23	41	18
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	(13) 56	(13) 30	(13) <2	(9,13) <10	(9,13) <10
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	(13) 150	(13) 250	(13) 14	(13) 21	(13) 170
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	(13) 23	(13) 890	(13) 54	(13) 78	(13) 770
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	(13) 2	(13) 1000	(13) 55	(13) 110	(13) 960

SAL Reference: 609132									
Project Site: Bowes Street									
Customer Reference: CS088198									
Soil					Analysed as Soil				
TPH (CWG) with MTBE, BTEX									
SAL Reference					609132 028	609132 029	609132 031	609132 032	609132 033
Customer Sample Reference					TP229	TP229	BH202	BH203	BH204
Bottom Depth					0.35	1.1	0.5	1.2	0.3
Date Sampled					20-OCT-2016	20-OCT-2016	19-OCT-2016	18-OCT-2016	18-OCT-2016
Type					Sandy Soil	Clay	Clay	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Benzene	T54	AR	1	µg/kg	(13) <1	(13) <1	(13) <1	(13) 1	(13) <1
Toluene	T54	AR	1	µg/kg	(13) <1	(13) <1	(13) <1	(13) 18	(13) <1
EthylBenzene	T54	AR	1	µg/kg	<1	2	<1	160	1
M/P Xylene	T54	AR	1	µg/kg	<1	4	1	220	2
O Xylene	T54	AR	1	µg/kg	<1	4	<1	130	<1
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
TPH (C5-C6 aliphatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C6-C8 aliphatic)	T54	AR	10	µg/kg	<10	310	<10	35	<10
TPH (C8-C10 aliphatic)	T54	AR	10	µg/kg	<10	830	<10	1800	<10
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	(13) <1	(9,13) <10	(13) <1	(13) <1	(13) <1
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	(13) 5	(13) 240	(13) 10	(13) 7	(13) <1
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	(13) 11	(13) 440	(13) 17	(13) 13	(13) <1
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	(13) 56	(13) 23	(13) 29	(13) 17	(13) <2
TPH (C6-C7 aromatic)	T54	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C7-C8 aromatic)	T54	AR	10	µg/kg	<10	<10	<10	18	<10
TPH (C8-C10 aromatic)	T54	AR	10	µg/kg	12	70	32	2500	20
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	(13) <2	(13) 17	(13) <2	(13) <2	(13) <2
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	(13) 5	(13) 230	(13) 9	(13) 22	(13) <1
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	(13) 19	(13) 450	(13) 29	(13) 70	(13) 7
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	(13) 26	(13) 280	(13) 29	(13) 77	(13) 12

Index to symbols used in 609132-1

Value	Description
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
A40	Assisted dried < 40C
AR	As Received
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
N.D.	Not Detected
9	LOD raised due to dilution of sample
2	LOD Raised Due to Matrix Interference
13	Results have been blank corrected.
110	LOD raised due to low internal standard recovery.
100	LOD determined by sample aliquot used for analysis
175	Results should be viewed with caution due to being outside of the instrument calibration range
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos subcontracted to REC Asbestos

Method Index

Value	Description
T6	ICP/OES
T54	GC/MS (Headspace)
T162	Grav (1 Dec) (105 C)
T207	GC/MS (MCERTS)
T27	PLM
T8	GC/FID
T206	GC/FID (MCERTS)
T209	GC/MS (Head Space)(MCERTS)
T2	Grav
T4	Colorimetry
T287	Calc TOC/0.58
T208	GC/MS (HR) (MCERTS)
T7	Probe
T1	GC/MS (HR)
T546	Colorimetry (CF)
T909	GCxGC

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Asbestos ID	T27	AR			SU	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
Cyanide(Total)	T546	AR	1	mg/kg	M	001-036
pH	T7	AR			M	001-036
Retained on 10mm sieve	T2	M40	0.1	%	N	001-036
Soil Organic Matter	T287	AR	0.1	%	N	001-036
SO4(2:1)	T6	AR	0.1	g/l	N	001-036
Sulphide	T4	AR	10	mg/kg	N	001-036
Sulphur (total)	T6	A40	0.01	%	N	001-036
Vanadium	T6	M40	1	mg/kg	M	001-036
Arsenic	T6	M40	2	mg/kg	M	001-036
Cadmium	T6	M40	1	mg/kg	M	001-036
Chromium	T6	M40	1	mg/kg	M	001-036
Copper	T6	M40	1	mg/kg	M	001-036
Lead	T6	M40	1	mg/kg	M	001-036
Mercury	T6	M40	1	mg/kg	M	001-036
Nickel	T6	M40	1	mg/kg	M	001-036
Selenium	T6	M40	3	mg/kg	M	001-036
Zinc	T6	M40	1	mg/kg	M	001-036
Naphthalene	T207	M105	0.1	mg/kg	M	001-036
Acenaphthylene	T207	M105	0.1	mg/kg	U	001-036

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Acenaphthene	T207	M105	0.1	mg/kg	M	001-036
Fluorene	T207	M105	0.1	mg/kg	M	001-036
Phenanthrene	T207	M105	0.1	mg/kg	M	001-036
Anthracene	T207	M105	0.1	mg/kg	U	001-036
Fluoranthene	T207	M105	0.1	mg/kg	M	001-036
Pyrene	T207	M105	0.1	mg/kg	M	001-036
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-036
Chrysene	T207	M105	0.1	mg/kg	M	001-036
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	001-036
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	001-036
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-036
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-036
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-036
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-036
PAH(total)	T207	M105	0.1	mg/kg	U	001-036
Benzene	T54	AR	1	µg/kg	U	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
Toluene	T54	AR	1	µg/kg	U	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
EthylBenzene	T54	AR	1	µg/kg	U	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
m/P Xylene	T54	AR	1	µg/kg	U	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
O Xylene	T54	AR	1	µg/kg	U	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	U	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
TPH (C5-C6 aliphatic)	T54	AR	10	µg/kg	N	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
TPH (C6-C8 aliphatic)	T54	AR	10	µg/kg	N	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
TPH (C8-C10 aliphatic)	T54	AR	10	µg/kg	N	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	U	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	U	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	U	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	U	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
TPH (C6-C7 aromatic)	T54	AR	10	µg/kg	N	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
TPH (C7-C8 aromatic)	T54	AR	10	µg/kg	N	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
TPH (C8-C10 aromatic)	T54	AR	10	µg/kg	N	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	U	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	U	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	U	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	U	001-005,007,009-010,013-014,016-019,021-024,026-029,031-033,035-036
Boron (water-soluble)	T6	AR	1	mg/kg	N	001-036
Chromium VI	T6	AR	1	mg/kg	N	001-036
Phenols(Mono)	T546	AR	1	mg/kg	M	001-036
SO4(Total)	T6	A40	0.01	%	N	001-036
TPH (C10-C12)	T206	M105	1	mg/kg	M	006,008,011-012,015,020,025,030,034
TPH (C12-C16)	T206	M105	1	mg/kg	M	006,008,011-012,015,020,025,030,034
TPH (C16-C21)	T206	M105	1	mg/kg	M	006,008,011-012,015,020,025,030,034
TPH (C21-C35)	T206	M105	1	mg/kg	M	006,008,011-012,015,020,025,030,034
TPH (C8-C10)	T8	M105	1	mg/kg	U	006,008,011-012,015,020,025,030,034
Moisture @105C	T162	AR	0.1	%	N	001-036
PCB BZ#28	T208	M105	0.05	µg/kg	M	023,027
PCB BZ#52	T208	M105	0.05	µg/kg	M	023,027
PCB BZ#101	T208	M105	0.05	µg/kg	M	023,027
PCB BZ#118	T208	M105	0.05	µg/kg	M	023,027
PCB BZ#153	T208	M105	0.05	µg/kg	M	023,027
PCB BZ#138	T208	M105	0.05	µg/kg	M	023,027
PCB BZ#180	T208	M105	0.05	µg/kg	M	023,027
PCB BZ#77	T1	M105	0.05	µg/kg	U	023,027
PCB BZ#81	T1	M105	0.05	µg/kg	U	023,027
PCB BZ#105	T1	M105	0.05	µg/kg	U	023,027
PCB BZ#114	T1	M105	0.05	µg/kg	U	023,027
PCB BZ#118	T1	M105	0.05	µg/kg	U	023,027
PCB BZ#123	T1	M105	0.05	µg/kg	U	023,027
PCB BZ#126	T1	M105	0.05	µg/kg	U	023,027
PCB BZ#156	T1	M105	0.05	µg/kg	U	023,027
PCB BZ#157	T1	M105	0.05	µg/kg	U	023,027
PCB BZ#167	T1	M105	0.05	µg/kg	U	023,027
PCB BZ#169	T1	M105	0.05	µg/kg	U	023,027
PCB BZ#189	T1	M105	0.05	µg/kg	U	023,027
Dichlorodifluoromethane	T209	M105	50	µg/kg	M	002,004,029,032
Chloromethane	T209	M105	50	µg/kg	U	002,004,029,032
Vinyl chloride	T209	M105	50	µg/kg	M	002,004,029,032
Bromomethane	T209	M105	50	µg/kg	U	002,004,029,032
Chloroethane	T209	M105	50	µg/kg	M	002,004,029,032
Trichlorofluoromethane	T209	M105	50	µg/kg	M	002,004,029,032

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
1,1-Dichloroethylene	T209	M105	50	µg/kg	M	002,004,029,032
Dichloromethane	T209	M105	50	µg/kg	U	002,004,029,032
Trans-1,2-Dichloroethene	T209	M105	50	µg/kg	M	002,004,029,032
1,1-Dichloroethane	T209	M105	50	µg/kg	M	002,004,029,032
Cis-1,2-Dichloroethylene	T209	M105	50	µg/kg	M	002,004,029,032
2,2-Dichloropropane	T209	M105	50	µg/kg	U	002,004,029,032
Chloroform	T209	M105	50	µg/kg	M	002,004,029,032
Bromochloromethane	T209	M105	50	µg/kg	M	002,004,029,032
1,1,1-Trichloroethane	T209	M105	50	µg/kg	M	002,004,029,032
1,1-Dichloropropene	T209	M105	50	µg/kg	M	002,004,029,032
Carbon tetrachloride	T209	M105	50	µg/kg	M	002,004,029,032
1,2-Dichloroethane	T209	M105	50	µg/kg	M	002,004,029,032
Benzene	T209	M105	10	µg/kg	M	002,004,029,032
1,2-Dichloropropane	T209	M105	50	µg/kg	M	002,004,029,032
Trichloroethene	T209	M105	50	µg/kg	M	002,004,029,032
Bromodichloromethane	T209	M105	50	µg/kg	M	002,004,029,032
Dibromomethane	T209	M105	50	µg/kg	M	002,004,029,032
Cis-1,3-Dichloropropene	T209	M105	50	µg/kg	M	002,004,029,032
Toluene	T209	M105	10	µg/kg	M	002,004,029,032
Trans-1,3-Dichloropropene	T209	M105	50	µg/kg	M	002,004,029,032
1,1,1,2-Trichloroethane	T209	M105	50	µg/kg	M	002,004,029,032
1,3-Dichloropropane	T209	M105	50	µg/kg	M	002,004,029,032
Tetrachloroethene	T209	M105	50	µg/kg	M	002,004,029,032
Chlorodibromomethane	T209	M105	50	µg/kg	M	002,004,029,032
1,2-dibromoethane	T209	M105	50	µg/kg	M	002,004,029,032
Chlorobenzene	T209	M105	50	µg/kg	M	002,004,029,032
1,1,1,2-Tetrachloroethane	T209	M105	50	µg/kg	M	002,004,029,032
EthylBenzene	T209	M105	10	µg/kg	M	002,004,029,032
M/P Xylene	T209	M105	10	µg/kg	M	002,004,029,032
O Xylene	T209	M105	10	µg/kg	M	002,004,029,032
Styrene	T209	M105	50	µg/kg	U	002,004,029,032
Bromoform	T209	M105	50	µg/kg	M	002,004,029,032
Isopropyl benzene	T209	M105	50	µg/kg	M	002,004,029,032
1,1,1,2,2-Tetrachloroethane	T209	M105	50	µg/kg	U	002,004,029,032
1,2,3-Trichloropropane	T209	M105	50	µg/kg	U	002,004,029,032
n-Propylbenzene	T209	M105	50	µg/kg	M	002,004,029,032
Bromobenzene	T209	M105	50	µg/kg	M	002,004,029,032
1,3,5-Trimethylbenzene	T209	M105	50	µg/kg	M	002,004,029,032
T-Butylbenzene	T209	M105	50	µg/kg	M	002,004,029,032
1,2,4-Trimethylbenzene	T209	M105	50	µg/kg	M	002,004,029,032
S-Butylbenzene	T209	M105	50	µg/kg	M	002,004,029,032
p-Isopropyltoluene	T209	M105	50	µg/kg	M	002,004,029,032
2-Chlorotoluene	T209	M105	50	µg/kg	U	002,004,029,032
4-Chlorotoluene	T209	M105	50	µg/kg	U	002,004,029,032
1,3-Dichlorobenzene	T209	M105	50	µg/kg	M	002,004,029,032
1,4-Dichlorobenzene	T209	M105	50	µg/kg	M	002,004,029,032
1,2-Dichlorobenzene	T209	M105	50	µg/kg	M	002,004,029,032

Scientific Analysis Laboratories Ltd

Certificate of Analysis

Report Number: 618272-1 Interim

Date of Report: 07-Dec-2016

Customer: Capita Property and Infrastructure Ltd
Clemence House
9 Mellor Road
Cheadle Hulme
Cheshire.
SK8 5AT

Customer Contact: Mr Andrew Watts

Customer Job Reference: CS088198
Customer Purchase Order: 4800177433
Customer Site Reference: Bowes Street
Date Job Received at SAL: 30-Nov-2016
Date Analysis Started: 01-Dec-2016
Date Analysis Completed:

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with SAL SOPs

All results have been reviewed in accordance with Section 25 of the SAL Quality Manual



1549

Report checked
and authorised by :

Issued by :
Mr Richard Wong
Project Manager



Capita Water Suite 1



SCIENTIFIC ANALYSIS
LABORATORIES

Water	Analysed as Water
TPH (CWG) with MTBE, BTEX	

SAL Reference					618272 001	618272 002	618272 003
Customer Sample Reference					BH204	BH205	BH206
Date Sampled					29-NOV-2016	29-NOV-2016	29-NOV-2016
Determinand	Method	Test Sample	LOD	Units			
Benzene	T54	AR	1	µg/l	(13) <1	(13) <1	(13) <1
Toluene	T54	AR	1	µg/l	<1	<1	<1
EthylBenzene	T54	AR	1	µg/l	<1	<1	<1
M/P Xylene	T54	AR	1	µg/l	<1	<1	<1
O Xylene	T54	AR	1	µg/l	<1	<1	<1
Methyl tert-Butyl Ether	T54	AR	1	µg/l	<1	<1	<1
TPH (C5-C6 aliphatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010
TPH (C6-C8 aliphatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010
TPH (C8-C10 aliphatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010
TPH (C10-C12 aliphatic)	T910	AR	0.01	mg/l			
TPH (C12-C16 aliphatic)	T910	AR	0.01	mg/l			
TPH (C16-C21 aliphatic)	T910	AR	0.01	mg/l			
TPH (C21-C35 aliphatic)	T910	AR	0.01	mg/l			
TPH (C6-C7 aromatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010
TPH (C7-C8 aromatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010
TPH (C8-C10 aromatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010
TPH (C10-C12 aromatic)	T910	AR	0.01	mg/l			
TPH (C12-C16 aromatic)	T910	AR	0.01	mg/l			
TPH (C16-C21 aromatic)	T910	AR	0.01	mg/l			
TPH (C21-C35 aromatic)	T910	AR	0.01	mg/l			

Value	Description
F	Filtered
AR	As Received
13	Results have been blank corrected.
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Interim report of available data
Please note interim results are considered preliminary and are subject to change

Value	Description
T4	Colorimetry
T7	Probe
T281	ICP/MS (Filtered)
T910	GCxGC (LV)
T215	GC/MS (Headspace)(LV)
T686	Discrete Analyser
T373	ICP/OES (Filtered)
T6	ICP/OES
T54	GC/MS (Headspace)
T149	GC/MS (SIR)

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
As (Dissolved)	T281	AR	0.2	µg/l	U	001-003
B (Dissolved)	T373	AR	10	µg/l	N	001-003
Cd (Dissolved)	T281	AR	0.02	µg/l	U	001-003

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Cr (Dissolved)	T281	AR	1	µg/l	U	001-003
Cu (Dissolved)	T281	AR	0.5	µg/l	U	001-003
Pb (Dissolved)	T281	AR	0.3	µg/l	U	001-003
Hg (Dissolved)	T281	AR	0.05	µg/l	U	001-003
Ni (Dissolved)	T281	AR	1	µg/l	U	001-003
Se (Dissolved)	T281	AR	0.5	µg/l	U	001-003
V (Dissolved)	T281	AR	2	µg/l	U	001-003
Zn (Dissolved)	T281	AR	2	µg/l	U	001-003
Hardness expressed as CaCO3	T6	AR	10	mg/l	N	001-003
Cyanide(Total)	T4	AR	0.05	mg/l	U	001-003
pH	T7	AR			U	001-003
Sulphate	T686	F	0.5	mg/l	U	001-003
Sulphide	T4	AR	0.05	mg/l	N	001-003
Naphthalene	T149	AR	0.01	µg/l	U	001-003
Acenaphthylene	T149	AR	0.01	µg/l	U	001-003
Acenaphthene	T149	AR	0.01	µg/l	U	001-003
Fluorene	T149	AR	0.01	µg/l	U	001-003
Phenanthrene	T149	AR	0.01	µg/l	U	001-003
Anthracene	T149	AR	0.01	µg/l	U	001-003
Fluoranthene	T149	AR	0.01	µg/l	U	001-003
Pyrene	T149	AR	0.01	µg/l	U	001-003
Benzo(a)Anthracene	T149	AR	0.01	µg/l	U	001-003
Chrysene	T149	AR	0.01	µg/l	U	001-003
Benzo(b)fluoranthene	T149	AR	0.01	µg/l	U	001-003
Benzo(k)fluoranthene	T149	AR	0.01	µg/l	U	001-003
Benzo(a)Pyrene	T149	AR	0.01	µg/l	U	001-003
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	U	001-003
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	U	001-003
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	U	001-003
PAH(total)	T149	AR	0.01	µg/l	U	001-003
Benzene	T54	AR	1	µg/l	U	001-003
Toluene	T54	AR	1	µg/l	U	001-003
EthylBenzene	T54	AR	1	µg/l	U	001-003
M/P Xylene	T54	AR	1	µg/l	U	001-003
O Xylene	T54	AR	1	µg/l	U	001-003
Methyl tert-Butyl Ether	T54	AR	1	µg/l	U	001-003
TPH (C5-C6 aliphatic)	T215	AR	0.010	mg/l	N	001-003
TPH (C6-C8 aliphatic)	T215	AR	0.010	mg/l	N	001-003
TPH (C8-C10 aliphatic)	T215	AR	0.010	mg/l	N	001-003
TPH (C10-C12 aliphatic)	T910	AR	0.01	mg/l	N	001-003
TPH (C12-C16 aliphatic)	T910	AR	0.01	mg/l	N	001-003
TPH (C16-C21 aliphatic)	T910	AR	0.01	mg/l	N	001-003
TPH (C21-C35 aliphatic)	T910	AR	0.01	mg/l	N	001-003
TPH (C6-C7 aromatic)	T215	AR	0.010	mg/l	N	001-003
TPH (C7-C8 aromatic)	T215	AR	0.010	mg/l	N	001-003
TPH (C8-C10 aromatic)	T215	AR	0.010	mg/l	N	001-003
TPH (C10-C12 aromatic)	T910	AR	0.01	mg/l	N	001-003
TPH (C12-C16 aromatic)	T910	AR	0.01	mg/l	N	001-003
TPH (C16-C21 aromatic)	T910	AR	0.01	mg/l	N	001-003
TPH (C21-C35 aromatic)	T910	AR	0.01	mg/l	N	001-003

Scientific Analysis Laboratories Ltd

Certificate of Analysis

Report Number: 631456-1

Date of Report: 13-Feb-2017

Customer: Capita Property and Infrastructure Ltd
Clemence House
9 Mellor Road
Cheadle Hulme
Cheshire.
SK8 5AT

Customer Contact: Mr Dan Mason

Customer Job Reference: CS088198

Customer Site Reference: Bowes Street

Date Job Received at SAL: 02-Feb-2017

Date Analysis Started: 07-Feb-2017

Date Analysis Completed: 13-Feb-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with SAL SOPs

All results have been reviewed in accordance with Section 25 of the SAL Quality Manual



Report checked
and authorised by :
Sara Abou-Shakra
Project Manager

Issued by :
Sara Abou-Shakra
Project Manager



SAL Reference: 631456									
Project Site: Bowes Street									
Customer Reference: CS088198									
Soil					Analysed as Soil				
MCERTS Preparation									
SAL Reference					631456 001	631456 002	631456 003	631456 004	631456 005
Customer Sample Reference					TP301	TP302	TP303	TP303	TP304
Bottom Depth					1.3	1.4	0.5	2.0	1.0
Date Sampled					01-FEB-2017	01-FEB-2017	01-FEB-2017	01-FEB-2017	01-FEB-2017
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
Moisture @105C	T162	AR	0.1	%	22	21	29	16	24

SAL Reference: 631456 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil MCERTS Preparation									
SAL Reference				631456 006	631456 007	631456 008	631456 009	631456 010	
Customer Sample Reference				TP305	TP306	TP307	TP308	TP309	
Bottom Depth				1.0	0.7	0.8	0.6	0.7	
Date Sampled				01-FEB-2017	01-FEB-2017	01-FEB-2017	01-FEB-2017	01-FEB-2017	
Type				Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units					
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
Moisture @105C	T162	AR	0.1	%	20	30	23	29	25

SAL Reference: 631456 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil MCERTS Preparation									
SAL Reference				631456 011	631456 012	631456 013	631456 014	631456 015	
Customer Sample Reference				TP310	TP311	TP312	TP313	TP314	
Bottom Depth				2.1	0.7	1.8	0.4	0.6	
Date Sampled				01-FEB-2017	01-FEB-2017	01-FEB-2017	01-FEB-2017	01-FEB-2017	
Type				Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units					
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
Moisture @105C	T162	AR	0.1	%	19	21	21	26	22

SAL Reference: 631456 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil MCERTS Preparation									
SAL Reference					631456 016	631456 017	631456 018	631456 019	631456 020
Customer Sample Reference					TP315	TP316	TP317	TP318	TP319
Bottom Depth					0.8	0.7	0.8	2.55	1.4
Date Sampled					02-FEB-2017	02-FEB-2017	02-FEB-2017	02-FEB-2017	02-FEB-2017
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
Moisture @105C	T162	AR	0.1	%	30	22	20	12	21

SAL Reference: 631456 Project Site: Bowes Street Customer Reference: CS088198 Soil Analysed as Soil MCERTS Preparation											
SAL Reference		631456 021		631456 022		631456 023		631456 024		631456 025	
Customer Sample Reference		TP319		TP320		TP321		TP321		TP322	
Bottom Depth		2.8		1.2		1.0		2.7		0.9	
Date Sampled		02-FEB-2017		02-FEB-2017		02-FEB-2017		02-FEB-2017		02-FEB-2017	
Type		Sandy Soil		Sandy Soil		Sandy Soil		Sandy Soil		Sandy Soil	
Determinand	Method	Test Sample	LOD	Units							
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Moisture @105C	T162	AR	0.1	%	8.2	17	17	8.5	8.5	20	20

SAL Reference: 631456							
Project Site: Bowes Street							
Customer Reference: CS088198							
Soil				Analysed as Soil			
MCERTS Preparation							
SAL Reference				631456 026	631456 027	631456 028	
Customer Sample Reference				TP323	TP324	TP325	
Bottom Depth				0.5	0.5	1.00	
Date Sampled				02-FEB-2017	02-FEB-2017	02-FEB-2017	
Type				Sandy Soil	Sandy Soil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units			
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1
Moisture @105C	T162	AR	0.1	%	24	24	16

SAL Reference: 631456									
Project Site: Bowes Street									
Customer Reference: CS088198									
Soil		Analysed as Soil							
PAH US EPA 16 (B and K split)									
SAL Reference				631456 001	631456 002	631456 003	631456 004	631456 005	
Customer Sample Reference				TP301	TP302	TP303	TP303	TP304	
Bottom Depth				1.3	1.4	0.5	2.0	1.0	
Date Sampled				01-FEB-2017	01-FEB-2017	01-FEB-2017	01-FEB-2017	01-FEB-2017	
Type				Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T207	M105	0.1	mg/kg	(9) <1.0	120	73	<0.1	22
Acenaphthylene	T207	M105	0.1	mg/kg	(9) <1.0	9.3	2.1	<0.1	2.4
Acenaphthene	T207	M105	0.1	mg/kg	3.0	73	54	<0.1	22
Fluorene	T207	M105	0.1	mg/kg	2.6	72	45	<0.1	20
Phenanthrene	T207	M105	0.1	mg/kg	16	440	200	0.2	130
Anthracene	T207	M105	0.1	mg/kg	4.2	93	51	<0.1	29
Fluoranthene	T207	M105	0.1	mg/kg	16	370	180	0.2	110
Pyrene	T207	M105	0.1	mg/kg	15	360	180	0.2	100
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	6.7	150	85	0.1	49
Chrysene	T207	M105	0.1	mg/kg	6.4	140	80	<0.1	43
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	4.5	89	50	<0.1	30
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	5.1	98	70	<0.1	30
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	5.8	120	73	<0.1	35
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	2.7	57	32	<0.1	19
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	(9) <1.0	17	9.8	<0.1	5.0
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	3.2	72	40	<0.1	22
PAH(total)	T207	M105	0.1	mg/kg	91	2300	1200	0.7	670

SAL Reference: 631456										
Project Site: Bowes Street										
Customer Reference: CS088198										
Soil					Analysed as Soil					
PAH US EPA 16 (B and K split)										
SAL Reference					631456 006		631456 007		631456 008	
Customer Sample Reference					TP305		TP306		TP307	
Bottom Depth					1.0		0.7		0.8	
Date Sampled					01-FEB-2017		01-FEB-2017		01-FEB-2017	
Type					Sandy Soil		Sandy Soil		Sandy Soil	
Determinand	Method	Test Sample	LOD	Units						
Naphthalene	T207	M105	0.1	mg/kg	<0.1	57	0.2	0.4	0.2	
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	6.0	<0.1	<0.1	<0.1	
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	53	0.7	2.3	0.3	
Fluorene	T207	M105	0.1	mg/kg	<0.1	54	0.6	2.0	0.3	
Phenanthrene	T207	M105	0.1	mg/kg	<0.1	270	5.3	17	2.4	
Anthracene	T207	M105	0.1	mg/kg	<0.1	70	1.1	4.9	0.5	
Fluoranthene	T207	M105	0.1	mg/kg	<0.1	230	6.2	14	2.8	
Pyrene	T207	M105	0.1	mg/kg	<0.1	220	6.1	13	2.6	
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	96	3.1	6.6	1.3	
Chrysene	T207	M105	0.1	mg/kg	<0.1	100	2.7	6.3	1.2	
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1	95	2.7	6.0	1.3	
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1	28	1.3	2.5	0.4	
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	74	2.4	4.9	1.0	
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	41	1.2	2.1	0.5	
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	11	0.3	0.7	0.1	
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	47	1.4	2.3	0.6	
PAH(total)	T207	M105	0.1	mg/ka	<0.1	1500	35	85	15	

SAL Reference: 631456									
Project Site: Bowes Street									
Customer Reference: CS088198									
Soil		Analysed as Soil							
PAH US EPA 16 (B and K split)									
SAL Reference				631456 011	631456 012		631456 013	631456 014	631456 015
Customer Sample Reference				TP310	TP311		TP312	TP313	TP314
Bottom Depth				2.1	0.7		1.8	0.4	0.6
Date Sampled				01-FEB-2017	01-FEB-2017		01-FEB-2017	01-FEB-2017	01-FEB-2017
Type				Sandy Soil	Sandy Soil		Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T207	M105	0.1	mg/kg	1.1	8.5	1.0	0.2	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	(9) <1.0	0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	0.9	6.3	1.1	0.3	0.2
Fluorene	T207	M105	0.1	mg/kg	0.7	6.0	1.1	0.2	0.1
Phenanthrene	T207	M105	0.1	mg/kg	2.4	54	7.7	1.7	1.1
Anthracene	T207	M105	0.1	mg/kg	0.6	13	1.7	0.4	0.2
Fluoranthene	T207	M105	0.1	mg/kg	1.2	60	8.0	1.8	1.2
Pyrene	T207	M105	0.1	mg/kg	1.0	55	7.7	1.7	1.2
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	0.4	24	3.8	0.7	0.5
Chrysene	T207	M105	0.1	mg/kg	0.4	24	3.1	0.7	0.5
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	0.4	24	3.2	0.7	0.5
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	0.1	9.9	0.5	0.2	0.2
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	0.3	20	3.0	0.5	0.4
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	0.1	12	1.5	0.2	0.2
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	2.9	0.4	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	0.2	14	1.7	0.3	0.3
PAH(total)	T207	M105	0.1	mg/kg	9.8	330	46	9.7	6.6

SAL Reference: 631456									
Project Site: Bowes Street									
Customer Reference: CS088198									
Soil		Analysed as Soil							
PAH US EPA 16 (B and K split)									
SAL Reference				631456 016	631456 017		631456 018	631456 019	631456 020
Customer Sample Reference				TP315	TP316		TP317	TP318	TP319
Bottom Depth				0.8	0.7		0.8	2.55	1.4
Date Sampled				02-FEB-2017	02-FEB-2017		02-FEB-2017	02-FEB-2017	02-FEB-2017
Type				Sandy Soil	Sandy Soil		Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T207	M105	0.1	mg/kg	<0.1	3.2	0.6	<0.1	0.4
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	0.4	2.5	0.6	<0.1	1.1
Fluorene	T207	M105	0.1	mg/kg	0.3	2.0	0.4	<0.1	1.0
Phenanthrene	T207	M105	0.1	mg/kg	2.3	12	3.0	<0.1	7.2
Anthracene	T207	M105	0.1	mg/kg	1.2	3.0	0.7	<0.1	1.7
Fluoranthene	T207	M105	0.1	mg/kg	2.1	10	2.6	<0.1	7.8
Pyrene	T207	M105	0.1	mg/kg	2.0	9.4	2.4	<0.1	7.6
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	0.9	4.5	1.0	<0.1	3.4
Chrysene	T207	M105	0.1	mg/kg	0.9	4.1	1.0	<0.1	3.5
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	0.9	4.3	1.0	<0.1	3.4
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	0.2	1.5	0.2	<0.1	1.3
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	0.7	3.5	0.8	<0.1	2.9
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	0.3	1.7	0.4	<0.1	1.4
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	0.5	0.1	<0.1	0.4
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	0.4	2.0	0.4	<0.1	1.7
PAH(total)	T207	M105	0.1	mg/kg	13	64	15	<0.1	45

SAL Reference: 631456 Project Site: Bowes Street Customer Reference: CS088198									
Soil		Analysed as Soil							
PAH US EPA 16 (B and K split)									
SAL Reference					631456 021	631456 022	631456 023	631456 024	631456 025
Customer Sample Reference					TP319	TP320	TP321	TP321	TP322
Bottom Depth					2.8	1.2	1.0	2.7	0.9
Date Sampled					02-FEB-2017	02-FEB-2017	02-FEB-2017	02-FEB-2017	02-FEB-2017
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T207	M105	0.1	mg/kg	<0.1	0.4	1.6	<0.1	0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Acenaphthene	T207	M105	0.1	mg/kg	0.1	0.5	1.7	<0.1	0.1
Fluorene	T207	M105	0.1	mg/kg	0.2	0.3	1.1	<0.1	0.2
Phenanthrene	T207	M105	0.1	mg/kg	2.5	2.7	4.3	<0.1	2.1
Anthracene	T207	M105	0.1	mg/kg	0.7	0.6	0.8	<0.1	0.5
Fluoranthene	T207	M105	0.1	mg/kg	3.2	3.1	2.6	<0.1	3.2
Pyrene	T207	M105	0.1	mg/kg	2.9	2.9	2.4	<0.1	2.9
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	1.1	1.5	1.2	<0.1	1.4
Chrysene	T207	M105	0.1	mg/kg	1.0	1.4	1.1	<0.1	1.3
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	0.9	1.5	1.3	<0.1	1.5
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	0.2	0.2	0.3	<0.1	0.6
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	0.7	1.2	0.9	<0.1	1.2
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	0.3	0.6	0.5	<0.1	0.7
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	0.2	0.1	<0.1	0.2
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	0.4	0.7	0.6	<0.1	0.8
PAH(total)	T207	M105	0.1	mg/kg	14	18	21	<0.1	17

SAL Reference: 631456 Project Site: Bowes Street Customer Reference: CS088198							
Soil				Analysed as Soil			
PAH US EPA 16 (B and K split)							
SAL Reference				631456 026	631456 027	631456 028	
Customer Sample Reference				TP323	TP324	TP325	
Bottom Depth				0.5	0.5	1.00	
Date Sampled				02-FEB-2017	02-FEB-2017	02-FEB-2017	
Type				Sandy Soil	Sandy Soil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units			
Naphthalene	T207	M105	0.1	mg/kg	0.5	<0.1	⁽⁹⁾ <1.0
Acenaphthylene	T207	M105	0.1	mg/kg	0.4	<0.1	⁽⁹⁾ <1.0
Acenaphthene	T207	M105	0.1	mg/kg	1.2	<0.1	⁽⁹⁾ <1.0
Fluorene	T207	M105	0.1	mg/kg	1.4	<0.1	⁽⁹⁾ <1.0
Phenanthrene	T207	M105	0.1	mg/kg	11	0.7	6.0
Anthracene	T207	M105	0.1	mg/kg	3.0	0.1	1.5
Fluoranthene	T207	M105	0.1	mg/kg	13	1.3	10
Pyrene	T207	M105	0.1	mg/kg	13	1.2	10
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	8.1	0.6	5.0
Chrysene	T207	M105	0.1	mg/kg	6.7	0.7	4.5
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	10	0.7	5.4
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	1.2	0.2	2.0
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	7.0	0.6	4.9
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	3.0	0.3	2.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	0.9	<0.1	⁽⁹⁾ <1.0
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	3.3	0.3	2.5
PAH(total)	T207	M105	0.1	mg/kg	85	6.7	54

SAL Reference: 631456									
Project Site: Bowes Street									
Customer Reference: CS088198									
Soil					Analysed as Soil				
TPH (CWG) with MTBE, BTEX									
SAL Reference					631456 001	631456 002	631456 003	631456 004	631456 005
Customer Sample Reference					TP301	TP302	TP303	TP303	TP304
Bottom Depth					1.3	1.4	0.5	2.0	1.0
Date Sampled					01-FEB-2017	01-FEB-2017	01-FEB-2017	01-FEB-2017	01-FEB-2017
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Benzene	T54	AR	1	µg/kg	(13) <1	(13) 12	(13) 1	(13) <1	(13) 2
Toluene	T54	AR	1	µg/kg	(13) <1	(13) 8	(13) 3	(13) 1	(13) 7
EthylBenzene	T54	AR	1	µg/kg	1	24	18	1	11
M/P Xylene	T54	AR	1	µg/kg	3	35	23	8	33
O Xylene	T54	AR	1	µg/kg	2	65	20	10	31
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	0.016	<0.010
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	0.045	<0.010
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	0.30	<0.010	<0.010	1.6	<0.010
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	(13) 32	(13) 1	(13,100) <10	(13) 2	(9,13) <10
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	(13) 86	(13) 3	(100,13) <10	(13) 4	(13) 17
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	(13) 230	(13) 9	(13) 13	(13) 5	(13) 62
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	(13) 270	(13) 15	(13) 50	(13) 60	(13) 100
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	<0.010	0.012	<0.010	<0.010	<0.010
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	0.064	0.39	0.37	0.64	0.35
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	(13) 40	(13) 6	(13) 31	(13) <2	(13) 27
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	(13) 320	(13) 42	(13) 160	(13) <1	(13) 350
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	(13) 860	(13) 160	(13) 420	(13) 2	(13) 1400
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	(13) 760	(13) 200	(13) 530	(13) <1	(13) 1700

SAL Reference: 631456									
Project Site: Bowes Street									
Customer Reference: CS088198									
Soil		Analysed as Soil							
TPH (CWG) with MTBE, BTEX									
SAL Reference					631456 016	631456 017	631456 018	631456 019	631456 020
Customer Sample Reference					TP315	TP316	TP317	TP318	TP319
Bottom Depth					0.8	0.7	0.8	2.55	1.4
Date Sampled					02-FEB-2017	02-FEB-2017	02-FEB-2017	02-FEB-2017	02-FEB-2017
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Benzene	T54	AR	1	µg/kg	(13) 5	(13) <1	(13) <1	(13) <1	(13) <1
Toluene	T54	AR	1	µg/kg	(13,100) <2	(13) 3	(13) <1	(13) <1	(13) <1
EthylBenzene	T54	AR	1	µg/kg	230	10	<1	<1	<1
M/P Xylene	T54	AR	1	µg/kg	32	15	1	<1	<1
O Xylene	T54	AR	1	µg/kg	26	9	<1	<1	<1
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	(100) <2	<1	<1	<1	<1
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	(100) <0.020	<0.010	<0.010	<0.010	<0.010
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	0.82	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	22	<0.010	<0.010	<0.010	<0.010
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	(13) 15	(13,9) <10	(13) <1	(13) <1	(13) <1
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	(13) 170	(13) 39	(13) 6	(13) <1	(13) 2
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	(13) 390	(13) 150	(13) 11	(13) <1	(13) 4
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	(13) 140	(13) 200	(13) 14	(13) <2	(13) 4
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	(100) <0.020	<0.010	<0.010	<0.010	<0.010
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	(100) <0.020	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	3.0	0.17	0.012	<0.010	<0.010
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	(13) 20	(13) 53	(13) <2	(13) <2	(13) <2
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	(13) 200	(13) 390	(13) 11	(13) <1	(13) 6
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	(13) 180	(13) 1600	(13) 39	(13) <1	(13) 26
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	(13) 120	(13) 1700	(13) 49	(13) <1	(13) 38

AR	0.010	mg/kg	<0.010	<0.010	<0.010
AR	0.010	mg/kg	<0.010	<0.010	<0.010
M105	1	mg/kg	(13) 2	(13) <1	(9,13) <10
M105	1	mg/kg	(13) 3	(13) <1	(13,9) <10
M105	1	mg/kg	(13) 4	(13) <1	(13,9) <10
M105	2	mg/kg	(13) 11	(13) 3	(13) 14
AR	0.010	mg/kg	<0.010	<0.010	<0.010
AR	0.010	mg/kg	<0.010	<0.010	<0.010
AR	0.010	mg/kg	<0.010	<0.010	<0.010
M105	2	mg/kg	(13) <2	(13) <2	(13,9) <10
M105	1	mg/kg	(13) 13	(13) 5	(13) 25
M105	1	mg/kg	(13) 64	(13) 29	(13) 150
M105	1	mg/kg	(13) 97	(13) 52	(13) 260

Index to symbols used in 631456-1

Value	Description
AR	As Received
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
100	LOD determined by sample aliquot used for analysis
13	Results have been blank corrected.
9	LOD raised due to dilution of sample
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

is not UKAS accredited

is not UKAS accredited

is not UKAS accredited

is not UKAS accredited

is not UKAS accredited

is not UKAS accredited

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Phenanthrene	T207	M105	0.1	mg/kg	M	001-028
Anthracene	T207	M105	0.1	mg/kg	U	001-028
Fluoranthene	T207	M105	0.1	mg/kg	M	001-028
Pyrene	T207	M105	0.1	mg/kg	M	001-028
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-028
Chrysene	T207	M105	0.1	mg/kg	M	001-028
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	001-028
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	001-028
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-028
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-028
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-028
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-028
PAH(total)	T207	M105	0.1	mg/kg	U	001-028
Benzene	T54	AR	1	µg/kg	U	001-028
Toluene	T54	AR	1	µg/kg	U	001-028
EthylBenzene	T54	AR	1	µg/kg	U	001-028
M/P Xylene	T54	AR	1	µg/kg	U	001-028
O Xylene	T54	AR	1	µg/kg	U	001-028
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	U	001-028
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	N	001-028
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	N	001-028
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	N	001-028
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	U	001-028
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	U	001-028
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	U	001-028
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	U	001-028
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	N	001-028
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	N	001-028
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	N	001-028
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	U	001-028
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	U	001-028
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	U	001-028
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	U	001-028

SCIENTIFIC ANALYSIS
LABORATORIES

Scientific Analysis Laboratories Ltd

Certificate of Analysis

Report Number: 634038-1

Date of Report: 22-Feb-2017

Customer: Capita Property and Infrastructure Ltd
Clemence House
9 Mellor Road
Cheadle Hulme
Cheshire.
SK8 5AT

Customer Contact: Mr Andrew Watts

Customer Job Reference: CS088198
Customer Purchase Order: 4800204063
Customer Site Reference: Bowes Street
Date Job Received at SAL: 14-Feb-2017
Date Analysis Started: 16-Feb-2017
Date Analysis Completed: 22-Feb-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with SAL SOPs

All results have been reviewed in accordance with Section 25 of the SAL Quality Manual



1549

Report checked
and authorised by :
Bianca Prince
Customer Service Manager

Issued by :
Bianca Prince
Customer Service Manager



100	LOD determined by sample aliquot used for analysis
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Method Index

Value	Description
T6	ICP/OES
T4	Colorimetry
T910	GCxGC (LV)
T281	ICP/MS (Filtered)
T149	GC/MS (SIR)
T7	Probe
T54	GC/MS (Headspace)
T215	GC/MS (Headspace)(LV)
T686	Discrete Analyser
T373	ICP/OES (Filtered)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
B (Dissolved)	T373	AR	0.01	mg/l	N	001-002
Cyanide(Total)	T4	AR	0.05	mg/l	U	001-002
Hardness expressed as CaCO3	T6	AR	10	mg/l	N	001-002
pH	T7	AR			U	001-002
Sulphate	T686	F	0.5	mg/l	U	001-002
Sulphide	T4	AR	0.05	mg/l	N	001-002
V (Dissolved)	T281	AR	2	µg/l	U	001-002
Naphthalene	T149	AR	0.01	µg/l	U	001-002
Acenaphthylene	T149	AR	0.01	µg/l	U	001-002
Acenaphthene	T149	AR	0.01	µg/l	U	001-002
Fluorene	T149	AR	0.01	µg/l	U	001-002
Phenanthrene	T149	AR	0.01	µg/l	U	001-002
Anthracene	T149	AR	0.01	µg/l	U	001-002
Fluoranthene	T149	AR	0.01	µg/l	U	001-002
Pyrene	T149	AR	0.01	µg/l	U	001-002
Benzo(a)Anthracene	T149	AR	0.01	µg/l	U	001-002
Chrysene	T149	AR	0.01	µg/l	U	001-002
Benzo(b)fluoranthene	T149	AR	0.01	µg/l	U	001-002
Benzo(k)fluoranthene	T149	AR	0.01	µg/l	U	001-002
Benzo(a)Pyrene	T149	AR	0.01	µg/l	U	001-002
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	U	001-002
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	U	001-002
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	U	001-002
PAH(total)	T149	AR	0.01	µg/l	U	001-002
As (Dissolved)	T281	AR	0.2	µg/l	U	001-002
Cd (Dissolved)	T281	AR	0.02	µg/l	U	001-002
Cr (Dissolved)	T281	AR	1	µg/l	U	001-002
Cu (Dissolved)	T281	AR	0.5	µg/l	U	001-002
Pb (Dissolved)	T281	AR	0.3	µg/l	U	001-002
Hg (Dissolved)	T281	AR	0.05	µg/l	U	001-002
Ni (Dissolved)	T281	AR	1	µg/l	U	001-002
Se (Dissolved)	T281	AR	0.5	µg/l	U	001-002
Zn (Dissolved)	T281	AR	2	µg/l	U	001-002
Benzene	T54	AR	1	µg/l	U	001-002
Toluene	T54	AR	1	µg/l	U	001-002
EthylBenzene	T54	AR	1	µg/l	U	001-002
M/P Xylene	T54	AR	1	µg/l	U	001-002
O Xylene	T54	AR	1	µg/l	U	001-002
Methyl tert-Butyl Ether	T54	AR	1	µg/l	U	001-002
TPH (C5-C6 aliphatic)	T215	AR	0.010	mg/l	N	001-002
TPH (C6-C8 aliphatic)	T215	AR	0.010	mg/l	N	001-002
TPH (C8-C10 aliphatic)	T215	AR	0.010	mg/l	N	001-002
TPH (C10-C12 aliphatic)	T910	AR	0.01	mg/l	N	001-002
TPH (C12-C16 aliphatic)	T910	AR	0.01	mg/l	N	001-002
TPH (C16-C21 aliphatic)	T910	AR	0.01	mg/l	N	001-002
TPH (C21-C35 aliphatic)	T910	AR	0.01	mg/l	N	001-002
TPH (C6-C7 aromatic)	T215	AR	0.010	mg/l	N	001-002
TPH (C7-C8 aromatic)	T215	AR	0.010	mg/l	N	001-002

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
TPH (C8-C10 aromatic)	T215	AR	0.010	mg/l	N	001-002
TPH (C10-C12 aromatic)	T910	AR	0.01	mg/l	N	001-002
TPH (C12-C16 aromatic)	T910	AR	0.01	mg/l	N	001-002
TPH (C16-C21 aromatic)	T910	AR	0.01	mg/l	N	001-002
TPH (C21-C35 aromatic)	T910	AR	0.01	mg/l	N	001-002



Scientific Analysis Laboratories Ltd

Certificate of Analysis

Report Number: 636117-1

Date of Report: 03-Mar-2017

Customer: Capita Property and Infrastructure Ltd
Clemence House
9 Mellor Road
Cheadle Hulme
Cheshire.
SK8 5AT

Customer Contact: Mr Andrew Watts

Customer Job Reference:

Customer Purchase Order: 4800204063

Customer Site Reference: Bowles Street

Date Job Received at SAL: 26-Feb-2017

Date Analysis Started: 27-Feb-2017

Date Analysis Completed: 03-Mar-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with SAL SOPs

All results have been reviewed in accordance with Section 25 of the SAL Quality Manual



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Report checked
and authorised by :
Aleksandra Pacula
Project Manager

Issued by :
Aleksandra Pacula
Project Manager



U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Method Index

Value	Description
T281	ICP/MS (Filtered)
T4	Colorimetry
T7	Probe
T686	Discrete Analyser
T910	GCxGC (LV)
T6	ICP/OES
T54	GC/MS (Headspace)
T373	ICP/OES (Filtered)
T215	GC/MS (Headspace)(LV)
T149	GC/MS (SIR)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
B (Dissolved)	T373	AR	0.01	mg/l	N	001
Cyanide(Total)	T4	AR	0.05	mg/l	U	001
Hardness expressed as CaCO3	T6	AR	10	mg/l	N	001
pH	T7	AR			U	001
Sulphate	T686	F	0.5	mg/l	U	001
Sulphide	T4	AR	0.05	mg/l	N	001
V (Dissolved)	T281	AR	2	µg/l	U	001
Naphthalene	T149	AR	0.01	µg/l	U	001
Acenaphthylene	T149	AR	0.01	µg/l	U	001
Acenaphthene	T149	AR	0.01	µg/l	U	001
Fluorene	T149	AR	0.01	µg/l	U	001
Phenanthrene	T149	AR	0.01	µg/l	U	001
Anthracene	T149	AR	0.01	µg/l	U	001
Fluoranthene	T149	AR	0.01	µg/l	U	001
Pyrene	T149	AR	0.01	µg/l	U	001
Benzo(a)Anthracene	T149	AR	0.01	µg/l	U	001
Chrysene	T149	AR	0.01	µg/l	U	001
Benzo(b)fluoranthene	T149	AR	0.01	µg/l	U	001
Benzo(k)fluoranthene	T149	AR	0.01	µg/l	U	001
Benzo(a)Pyrene	T149	AR	0.01	µg/l	U	001
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	U	001
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	U	001
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	U	001
PAH(total)	T149	AR	0.01	µg/l	U	001
As (Dissolved)	T281	AR	0.2	µg/l	U	001
Cd (Dissolved)	T281	AR	0.02	µg/l	U	001
Cr (Dissolved)	T281	AR	1	µg/l	U	001
Cu (Dissolved)	T281	AR	0.5	µg/l	U	001
Pb (Dissolved)	T281	AR	0.3	µg/l	U	001
Hg (Dissolved)	T281	AR	0.05	µg/l	U	001
Ni (Dissolved)	T281	AR	1	µg/l	U	001
Se (Dissolved)	T281	AR	0.5	µg/l	U	001
Zn (Dissolved)	T281	AR	2	µg/l	U	001
Benzene	T54	AR	1	µg/l	U	001
Toluene	T54	AR	1	µg/l	U	001
EthylBenzene	T54	AR	1	µg/l	U	001
M/P Xylene	T54	AR	1	µg/l	U	001
O Xylene	T54	AR	1	µg/l	U	001
Methyl tert-Butyl Ether	T54	AR	1	µg/l	U	001
TPH (C5-C6 aliphatic)	T215	AR	0.010	mg/l	N	001
TPH (C6-C8 aliphatic)	T215	AR	0.010	mg/l	N	001
TPH (C8-C10 aliphatic)	T215	AR	0.010	mg/l	N	001
TPH (C10-C12 aliphatic)	T910	AR	0.01	mg/l	N	001
TPH (C12-C16 aliphatic)	T910	AR	0.01	mg/l	N	001
TPH (C16-C21 aliphatic)	T910	AR	0.01	mg/l	N	001
TPH (C21-C35 aliphatic)	T910	AR	0.01	mg/l	N	001
TPH (C6-C7 aromatic)	T215	AR	0.010	mg/l	N	001
TPH (C7-C8 aromatic)	T215	AR	0.010	mg/l	N	001
TPH (C8-C10 aromatic)	T215	AR	0.010	mg/l	N	001

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
TPH (C10-C12 aromatic)	T910	AR	0.01	mg/l	N	001
TPH (C12-C16 aromatic)	T910	AR	0.01	mg/l	N	001
TPH (C16-C21 aromatic)	T910	AR	0.01	mg/l	N	001
TPH (C21-C35 aromatic)	T910	AR	0.01	mg/l	N	001



Scientific Analysis Laboratories Ltd

Certificate of Analysis

Report Number: 635421-1

Date of Report: 01-Mar-2017

Customer: Capita Property and Infrastructure Ltd
Clemence House
9 Mellor Road
Cheadle Hulme
Cheshire.
SK8 5AT

Customer Contact: Mr Andrew Watts

Customer Job Reference: CS088198
Customer Purchase Order: 4800204063
Customer Site Reference: Bowes Street
Date Job Received at SAL: 22-Feb-2017
Date Analysis Started: 23-Feb-2017
Date Analysis Completed: 01-Mar-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with SAL SOPs

All results have been reviewed in accordance with Section 25 of the SAL Quality Manual

Report checked
and authorised by :
Lauren Clarke
Project Manager

Issued by :
Lauren Clarke
Project Manager

SAL Reference: 635421 Project Site: Bowes Street Customer Reference: CS088198 Gas Bag Analysed as Gas Bag Methane					
SAL Reference					635421 001
Customer Sample Reference					BH202
Test Sample					AR
Date Sampled					20-FEB-2017
Determinand	Method	LOD	Units	Symbol	
Methane	GC/TCD	0.02	%	N	2.4

SAL Reference: 635421 Project Site: Bowes Street Customer Reference: CS088198 Gas Bag Analysed as Gas Bag VOC Screen					
SAL Reference					635421 001
Customer Sample Reference					BH202
Test Sample					AR
Date Sampled					20-FEB-2017
Determinand	Method	LOD	Units	Symbol	
VOC Screen	GC/MS		mg/m3	N	N.D.

Index to symbols used in 635421-1

Value	Description
AR	As Received
N.D.	Not Detected
N	Analysis is not UKAS accredited

Appendix E Generic Quantitative Risk Assessment

AC	Assessment Criteria
Normality	Shapiro-Wilk test provides a reliable check on whether a test based on normality (like the one-sample t-test) can be applied on the data set under scrutiny. Where the size of a data set is greater than $n=50$ a visual assessment of the normality of the data is undertaken using a probability plot. Normal, deviation of the data set from normality is not significant. One-sample t-test can be used when testing the mean against a Critical concentration/AC Not Normal, deviation of the data set from normality has been identified as being significant. If normality of a relatively large data set appears to be normal through visual assessment but is indicated to be not normal by the Shapiro-Wilk test, then the One-side Chebychev Theorem has used when testing the mean against a Critical concentration/AC.
No. exceeding GAC	Number of sample concentrations exceeding the defined AC.
No. Outliers	Number of statistical Outliers determined using Grubbs Test for data sets $n>2$. Where the maximum value in a data set has been identified as an outlier, the test has been repeated on the second largest value (by removing the max value) and then the 3rd largest value... etc, until the maximum concentration is not reported as an
Test	t, the one-sample t-test (for datasets $n>1$) c, the one-sided Chebychev Theorem or Chebychev Inequality (for data sets $n>1$) N.B. the tests for comparing the mean against a critical concentration can only be applied when $n>1$ and the sample population standard deviation >0
UCL95%	95% Upper Confidence Limit (of the true population mean)
Test Result	FAIL, the 95% UCL exceeds the defined AC. PASS, the 95% UCL does not exceed the defined AC
Bold Red Type	Used to highlight the "No. exceeding AC", "no. Outliers" and "Test Result" on the Summary of Statistics Sheet. Where the test result is reported as "FAIL" the whole row for a particular contaminant is highlighted.
Filled Cells	Used to highlight exceedances (individual sample concentrations exceeding the AC) in the Summary of Concentrations sheets.
<u>Bold Underlined</u>	Used to highlight maximum value outliers (as determined using an iterative Grubbs Test) in the Summary of Concentrations sheets. Outliers may also be shown in filled cells (exceedances).

Summary of Statistics

Geology:

0.0

Site End Use:

Residential With Plant Uptake

Soil Type:

Sand - 1% SOM

Project Number CS088198

Client: Rowlinson Constructions Ltd

Compound	AC (mg/kg)	No. Samples	Range of values (mg/kg)	No. exceeding AC	Normality	No. Outliers	Test	UCL _{95%} (of the true population mean)	Test Result
Metals									
Arsenic SGV	37	36	2 - 44	1	Normal	1	t	10.3	PASS
Boron	290	36	1 - 1	0					
Cadmium SGV	11	36	1 - 3	0	Not Normal	1	c	1.3	PASS
Chromium VI	6	36	1 - 1	0					
Copper	2400	36	4 - 7700	1	Not Normal	5	c	1178.8	PASS
Lead*	180	36	3 - 420	5	Normal	1	t	106.3	PASS
Mercury SGV	1.2	36	1 - 1	0					
Nickel SGV	180	36	6 - 43	0	Normal	None	t	20.9	PASS
Selenium SGV	250	36	3 - 3	0					
Vanadium	410	36	7 - 41	0	Normal	None	t	25.0	PASS
Zinc	3700	36	8 - 430	0	Normal	3	t	110.3	PASS
Non-Metals									
Inorganic Cyanide	780	36	1 - 1	0					
TPH									
Aliphatic C5-6	42	27	0.01 - 0.02	0	Not Normal	1	c	0.0	PASS
Aliphatic C6-8	100	27	0.01 - 3	0	Not Normal	3	c	0.6	PASS
Aliphatic C8-10	27	27	0.01 - 360	1	Not Normal	4	c	71.6	FAIL
Aliphatic C10-12	130	27	1 - 48	0	Not Normal	1	c	13.5	PASS
Aliphatic C12-16	1100	27	1 - 250	0	Normal	6	t	59.1	PASS
Aliphatic C16-21	N/A	27	1 - 440	N/A	Normal	7	N/A	91.9	N/A
Aliphatic C21-35	N/A	27	2 - 100	N/A	Not Normal	2	N/A	45.4	N/A
Aliphatic C16-35	65000	27	3 - 463	0	Normal	4	t	116.4	PASS
Aromatic C8-10	34	27	0.01 - 310	2	Not Normal	7	c	64.0	FAIL
Aromatic C10-12	74	27	2 - 56	0	Not Normal	3	c	17.4	PASS
Aromatic C12-16	140	27	1 - 250	4	Normal	6	t	69.3	PASS
Aromatic C16-21	260	27	1 - 980	4	Normal	7	t	215.3	PASS
Aromatic C21-35	1100	27	1 - 1000	0	Normal	8	t	235.2	PASS
VOCs									
Benzene SGV	0.087	4	0.01 - 0.01	0					
Chloroethene	0.00064	0							
1,2-Dichloroethane	0.0071	0							
Ethylbenzene SGV	47	4	0.01 - 0.28	0	Not Normal	1	c	0.4	PASS
Naphthalene*	5.5	4	0.1 - 26	1	Normal	2	t	22.0	FAIL
Tetrachloroethanes*	0.41	4	0.05 - 0.05	0					
Tetrachloroethene	0.18	4	0.05 - 0.05	0					
Tetrachloromethane	0.26	4	0.05 - 0.05	0					
Toluene SGV	130	4	0.01 - 0.036	0	Not Normal	1	c	0.0	PASS
1,1,1-Trichloroethane	8.8	4	0.05 - 0.05	0					
Trichloroethene	0.016	0							
Xylenes SGV**	20	4	0.02 - 0.68	0	Normal	2	t	0.6	PASS
SVOCs									
Benz[a]anthracene	7.2	36	0.1 - 120	7	Not Normal	11	c	25.2	FAIL
Benzo[a]pyrene	2.2	36	0.1 - 80	11	Not Normal	18	c	17.7	FAIL
Benzo[b]fluoranthene	2.6	36	0.1 - 78	9	Not Normal	21	c	16.2	FAIL
Benzo[ghi]perylene	320	36	0.1 - 44	0	Not Normal	19	c	10.6	PASS
Benzo[k]fluoranthene	77	36	0.1 - 60	0	Not Normal	17	c	13.5	PASS
Chrysene	15	36	0.1 - 130	5	Not Normal	11	c	28.9	FAIL
Dibenz[ah]anthracene	0.24	36	0.1 - 16	10	Not Normal	10	c	3.4	FAIL
Fluoranthene	280	36	0.1 - 240	0	Not Normal	19	c	50.6	PASS
Indeno[123-cd]pyrene	27	36	0.1 - 40	2	Not Normal	17	c	9.5	PASS
Naphthalene	2.3	36	0.1 - 26	7	Not Normal	16	c	5.6	FAIL
Phenol SGV	280	0							
Pyrene	620	36	0.1 - 230	0	Not Normal	10	c	48.8	PASS

Summary of Concentrations

Geology:

0.0

Site End Use:

Residential With Plant Uptake

Soil Type:

Sand - 1% SOM

Project Number CS088198

Client: Rowlinson Constructions Ltd

		1	2	3	4	5	6	7	8	9	10
Compound	GAC	TP201	TP201	TP202	TP203	TP204	TP204	TP205	TP205	TP206	TP208
		2.20m	2.60m	0.05m	1.10m	0.80m	1.00m	1.40m	2.15m	0.50m	2.00m
Metals											
Arsenic SGV	37	2	2	2	5	5	10	6	2	2	2
Boron	290	1	1	1	1	1	1	1	1	1	1
Cadmium SGV	11	1	1	1	1	1	1	1	1	1	1
Chromium VI	6	1	1	1	1	1	1	1	1	1	1
Copper	2400	6	7	5	16	15	25	14	6	8	4
Lead	180	7	3	9	33	22	17	35	9	22	3
Mercury SGV	1.2	1	1	1	1	1	1	1	1	1	1
Nickel SGV	180	10	7	9	13	13	38	12	9	10	6
Selenium SGV	250	3	3	3	3	3	3	3	3	3	3
Vanadium	410	11	10	10	21	17	27	16	17	13	8
Zinc	3700	17	12	16	34	29	50	25	15	24	8
Non-Metals											
Inorganic Cyanide	780	1	1	1	1	1	1	1	1	1	1
TPH											
Aliphatic C5-6	42	0.01	0.01	0.01	0.01	0.01	-	0.01	-	0.01	0.01
Aliphatic C6-8	100	0.01	0.01	0.01	0.01	0.01	-	0.01	-	0.01	0.01
Aliphatic C8-10	27	0.01	0.01	0.01	0.01	0.01	-	0.01	-	0.01	0.01
Aliphatic C10-12	130	1	1	1	1	1	-	1	-	5	1
Aliphatic C12-16	1100	4	1	75	1	2	-	3	-	180	52
Aliphatic C16-21	N/A	2	1	280	1	2	-	4	-	260	160
Aliphatic C21-35	N/A	2	2	27	2	2	-	2	-	35	19
Aliphatic C16-35	65000	4	3	307	3	4	-	6	-	295	179
Aromatic C8-10	34	0.01	0.01	0.01	0.01	0.01	-	0.01	-	0.01	0.01
Aromatic C10-12	74	2	2	2	2	2	-	2	-	10	2
Aromatic C12-16	140	2	1	34	2	4	-	10	-	89	6
Aromatic C16-21	260	5	1	110	7	14	-	31	-	49	45
Aromatic C21-35	1100	5	1	32	8	16	-	39	-	13	9
VOCs											
Benzene SGV	0.087	-	0.01	-	0.01	-	-	-	-	-	-
Chloroethene	0.00064	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.0071	-	-	-	-	-	-	-	-	-	-
Ethylbenzene SGV	47	-	0.01	-	0.01	-	-	-	-	-	-
Naphthalene	5.5	-	0.1	-	0.1	-	-	-	-	-	-
Tetrachloroethanes	0.41	-	0.05	-	0.05	-	-	-	-	-	-
Tetrachloroethene	0.18	-	0.05	-	0.05	-	-	-	-	-	-
Tetrachloromethane	0.26	-	0.05	-	0.05	-	-	-	-	-	-
Toluene SGV	130	-	0.01	-	0.01	-	-	-	-	-	-
1,1,1-Trichloroethane	8.8	-	0.05	-	0.05	-	-	-	-	-	-
Trichloroethene	0.016	-	-	-	-	-	-	-	-	-	-
Xylenes SGV	20	-	0.02	-	0.02	-	-	-	-	-	-
SVOCs											
Benz[a]anthracene	7.2	0.1	0.1	0.1	0.4	8.2	0.1	0.2	0.2	0.2	0.1
Benzo[a]pyrene	2.2	0.1	0.1	0.1	0.3	6.8	0.1	0.2	0.2	0.2	0.1
Benzo[b]fluoranthene	2.6	0.1	0.1	0.1	0.4	6.9	0.1	0.2	0.2	0.3	0.1
Benzo[ghi]perylene	320	0.1	0.1	0.1	0.2	3.3	0.1	0.1	0.1	0.2	0.1
Benzo[k]fluoranthene	77	0.1	0.1	0.1	0.1	4.2	0.1	0.1	0.1	0.1	0.1
Chrysene	15	0.1	0.1	0.1	0.4	6.8	0.1	0.2	0.2	0.2	0.1
Dibenz[ah]anthracene	0.24	0.1	0.1	0.1	0.1	1	0.1	0.1	0.1	0.1	0.1
Fluoranthene	280	0.1	0.1	0.3	1	11	0.1	0.5	0.4	0.5	0.1
Indeno[123-cd]pyrene	27	0.1	0.1	0.1	0.1	3.1	0.1	0.1	0.1	0.2	0.1
Naphthalene	2.3	0.1	0.1	0.1	0.1	0.8	0.1	0.3	0.1	0.1	0.1
Phenol SGV.	280	-	-	-	-	-	-	-	-	-	-
Pyrene	620	0.1	0.1	0.3	0.9	10	0.1	0.4	0.4	0.5	0.1

Sample concentrations in mg/kg

Summary of Concentrations

Geology:

0.0

Site End Use:

Residential With Plant Uptake

Soil Type:

Sand - 1% SOM

Project Number CS088198

Client: Rowlinson Constructions Ltd

		11	12	13	14	15	16	17	18	19	20
Compound	GAC	TP209	TP210	TP211	TP212	TP213	TP214	TP214	TP215	TP216	TP217
		1.80m	2.70m	0.05m	2.50m	1.00m	2.10m	4.20m	0.70m	0.60m	0.50m
Metals											
Arsenic SGV	37	4	3	2	2	8	5	2	11	9	7
Boron	290	1	1	1	1	1	1	1	1	1	1
Cadmium SGV	11	1	1	1	1	1	1	1	1	1	1
Chromium VI	6	1	1	1	1	1	1	1	1	1	1
Copper	2400	6	5	6	4	19	18	4	38	25	25
Lead	180	3	3	8	4	36	43	5	100	110	17
Mercury SGV	1.2	1	1	1	1	1	1	1	1	1	1
Nickel SGV	180	7	6	10	13	24	19	8	18	16	34
Selenium SGV	250	3	3	3	3	3	3	3	3	3	3
Vanadium	410	10	9	11	12	21	21	7	34	28	31
Zinc	3700	11	10	16	15	52	45	11	80	170	56
Non-Metals											
Inorganic Cyanide	780	1	1	1	1	1	1	1	1	1	1
TPH											
Aliphatic C5-6	42	-	-	0.01	0.01	-	0.01	<u>0.02</u>	0.01	0.01	-
Aliphatic C6-8	100	-	-	0.01	0.01	-	0.01	<u>3</u>	0.01	0.01	-
Aliphatic C8-10	27	-	-	0.01	0.01	-	<u>0.97</u>	<u>360</u>	0.01	0.01	-
Aliphatic C10-12	130	-	-	1	1	-	<u>48</u>	10	1	10	-
Aliphatic C12-16	1100	-	-	8	13	-	<u>250</u>	<u>38</u>	1	16	-
Aliphatic C16-21	N/A	-	-	23	9	-	<u>130</u>	<u>59</u>	1	25	-
Aliphatic C21-35	N/A	-	-	<u>78</u>	2	-	4	39	2	66	-
Aliphatic C16-35	65000	-	-	101	11	-	134	98	3	91	-
Aromatic C8-10	34	-	-	0.01	0.01	-	<u>0.41</u>	<u>310</u>	0.023	<u>41</u>	-
Aromatic C10-12	74	-	-	2	2	-	<u>56</u>	<u>30</u>	2	10	-
Aromatic C12-16	140	-	-	2	8	-	<u>150</u>	<u>250</u>	14	21	-
Aromatic C16-21	260	-	-	1	4	-	23	<u>980</u>	54	78	-
Aromatic C21-35	1100	-	-	1	1	-	2	<u>1000</u>	55	<u>110</u>	-
VOCs											
Benzene SGV	0.087	-	-	-	-	-	-	-	-	-	-
Chloroethene	0.00064	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.0071	-	-	-	-	-	-	-	-	-	-
Ethylbenzene SGV	47	-	-	-	-	-	-	-	-	-	-
Naphthalene	5.5	-	-	-	-	-	-	-	-	-	-
Tetrachloroethanes	0.41	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	0.18	-	-	-	-	-	-	-	-	-	-
Tetrachloromethane	0.26	-	-	-	-	-	-	-	-	-	-
Toluene SGV	130	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	8.8	-	-	-	-	-	-	-	-	-	-
Trichloroethene	0.016	-	-	-	-	-	-	-	-	-	-
Xylenes SGV	20	-	-	-	-	-	-	-	-	-	-
SVOCs											
Benz[a]anthracene	7.2	0.1	0.1	0.1	0.1	0.1	0.7	1.4	1.8	1.6	0.1
Benzo[a]pyrene	2.2	0.1	0.1	0.1	0.1	0.1	<u>0.5</u>	0.1	<u>1.5</u>	<u>1.3</u>	0.1
Benzo[b]fluoranthene	2.6	0.1	0.1	0.1	0.1	0.1	<u>0.4</u>	0.1	<u>1.3</u>	<u>1.3</u>	0.1
Benzo[ghi]perylene	320	0.1	0.1	0.1	0.1	0.1	<u>0.3</u>	0.1	<u>1.1</u>	<u>1</u>	0.1
Benzo[k]fluoranthene	77	0.1	0.1	0.1	0.1	0.1	<u>0.4</u>	0.1	<u>1.1</u>	<u>0.8</u>	0.1
Chrysene	15	0.1	0.1	0.1	0.1	0.1	0.9	1.7	2	2	0.1
Dibenz[ah]anthracene	0.24	0.1	0.1	0.1	0.1	0.1	0.1	0.1	<u>0.3</u>	<u>0.3</u>	0.1
Fluoranthene	280	0.1	0.1	0.2	0.1	0.1	<u>1.8</u>	<u>3.9</u>	<u>3.9</u>	<u>3.2</u>	0.2
Indeno[123-cd]pyrene	27	0.1	0.1	0.1	0.1	0.1	<u>0.3</u>	0.1	<u>0.9</u>	<u>0.8</u>	0.1
Naphthalene	2.3	0.1	0.1	0.1	0.1	0.1	0.1	<u>9.1</u>	<u>1.1</u>	<u>0.2</u>	0.1
Phenol SGV.	280	-	-	-	-	-	-	-	-	-	-
Pyrene	620	0.1	0.1	0.2	0.1	0.1	1.7	4	3.8	3.4	0.2

Sample concentrations in mg/kg

Summary of Concentrations

Geology:

0.0

Site End Use:

Residential With Plant Uptake

Soil Type:

Sand - 1% SOM

Project Number CS088198

Client: Rowlinson Constructions Ltd

		21	22	23	24	25	26	27	28	29	30
Compound	GAC	TP218	TP220	TP221	TP224	TP224	TP225	TP227	TP229	TP229	TP230
		0.70m	1.00m	0.30m	0.40m	1.80m	1.00m	1.80m	0.35m	1.10m	1.80m
Metals											
Arsenic SGV	37	7	<u>44</u>	11	12	9	19	13	8	17	11
Boron	290	1	1	1	1	1	1	1	1	1	1
Cadmium SGV	11	<u>3</u>	1	1	1	1	1	1	1	1	1
Chromium VI	6	1	1	1	1	1	1	1	1	1	1
Copper	2400	23	<u>7700</u>	<u>410</u>	<u>70</u>	58	<u>86</u>	44	30	<u>80</u>	34
Lead	180	120	<u>420</u>	<u>220</u>	110	17	<u>200</u>	100	130	<u>240</u>	27
Mercury SGV	1.2	1	1	1	1	1	1	1	1	1	1
Nickel SGV	180	11	43	16	25	30	24	28	12	22	36
Selenium SGV	250	3	3	3	3	3	3	3	3	3	3
Vanadium	410	23	41	26	28	26	32	36	24	35	33
Zinc	3700	<u>430</u>	<u>320</u>	140	97	56	120	75	190	130	68
Non-Metals											
Inorganic Cyanide	780	1	1	1	1	1	1	1	1	1	1
TPH											
Aliphatic C5-6	42	0.01	0.01	0.01	0.01	-	0.01	0.01	0.01	0.01	-
Aliphatic C6-8	100	0.01	0.01	0.01	0.01	-	0.01	0.01	0.01	<u>0.31</u>	-
Aliphatic C8-10	27	0.01	0.01	0.01	0.01	-	0.01	0.01	0.01	<u>0.83</u>	-
Aliphatic C10-12	130	10	10	10	10	-	1	1	1	10	-
Aliphatic C12-16	1100	10	19	10	10	-	1	1	5	<u>240</u>	-
Aliphatic C16-21	N/A	11	<u>32</u>	10	10	-	1	1	11	<u>440</u>	-
Aliphatic C21-35	N/A	10	59	10	10	-	2	2	56	23	-
Aliphatic C16-35	65000	21	91	20	20	-	3	3	67	<u>463</u>	-
Aromatic C8-10	34	<u>18</u>	<u>0.25</u>	0.061	0.054	-	0.075	0.01	0.012	0.07	-
Aromatic C10-12	74	10	10	10	10	-	2	2	2	<u>17</u>	-
Aromatic C12-16	140	<u>170</u>	<u>110</u>	29	10	-	7	5	5	<u>230</u>	-
Aromatic C16-21	260	<u>770</u>	<u>440</u>	<u>140</u>	10	-	36	21	19	<u>450</u>	-
Aromatic C21-35	1100	<u>960</u>	<u>540</u>	<u>190</u>	10	-	46	28	26	<u>280</u>	-
VOCs											
Benzene SGV	0.087	-	-	-	-	-	-	-	-	0.01	-
Chloroethene	0.00064	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.0071	-	-	-	-	-	-	-	-	-	-
Ethylbenzene SGV	47	-	-	-	-	-	-	-	-	0.01	-
Naphthalene	5.5	-	-	-	-	-	-	-	-	<u>2.6</u>	-
Tetrachloroethanes	0.41	-	-	-	-	-	-	-	-	0.05	-
Tetrachloroethene	0.18	-	-	-	-	-	-	-	-	0.05	-
Tetrachloromethane	0.26	-	-	-	-	-	-	-	-	0.05	-
Toluene SGV	130	-	-	-	-	-	-	-	-	0.01	-
1,1,1-Trichloroethane	8.8	-	-	-	-	-	-	-	-	0.05	-
Trichloroethene	0.016	-	-	-	-	-	-	-	-	-	-
Xylenes SGV	20	-	-	-	-	-	-	-	-	<u>0.028</u>	-
SVOCs											
Benz[a]anthracene	7.2	<u>3.7</u>	<u>120</u>	<u>3.2</u>	<u>13</u>	0.1	<u>46</u>	0.8	<u>14</u>	<u>11</u>	0.2
Benzo[a]pyrene	2.2	<u>2.7</u>	<u>80</u>	<u>2.8</u>	<u>10</u>	0.1	<u>35</u>	<u>0.6</u>	<u>10</u>	<u>8.1</u>	0.1
Benzo[b]fluoranthene	2.6	<u>2.4</u>	<u>78</u>	<u>2.7</u>	<u>7.4</u>	0.1	<u>30</u>	<u>0.5</u>	<u>9.1</u>	<u>6.3</u>	0.1
Benzo[ghi]perylene	320	<u>2</u>	<u>44</u>	<u>2</u>	<u>6.2</u>	0.1	<u>21</u>	<u>0.4</u>	<u>6.9</u>	<u>5.4</u>	0.1
Benzo[k]fluoranthene	77	<u>2</u>	<u>60</u>	<u>1.5</u>	<u>8.1</u>	0.1	<u>27</u>	<u>0.5</u>	<u>7.7</u>	<u>7</u>	0.1
Chrysene	15	<u>4.7</u>	<u>130</u>	<u>3.8</u>	<u>17</u>	0.1	<u>58</u>	0.9	<u>18</u>	<u>14</u>	0.2
Dibenz[ah]anthracene	0.24	0.1	<u>16</u>	<u>0.6</u>	<u>1.7</u>	0.1	<u>6.1</u>	0.1	<u>1.8</u>	<u>1.4</u>	0.1
Fluoranthene	280	<u>9.7</u>	<u>240</u>	<u>5.1</u>	<u>32</u>	0.1	<u>92</u>	<u>1.7</u>	<u>34</u>	<u>26</u>	0.4
Indeno[123-cd]pyrene	27	<u>1.6</u>	<u>40</u>	<u>1.7</u>	<u>5.2</u>	0.1	<u>19</u>	<u>0.4</u>	<u>5.9</u>	<u>4.6</u>	0.1
Naphthalene	2.3	<u>1.8</u>	<u>12</u>	<u>1.1</u>	<u>3.7</u>	0.1	<u>6.5</u>	<u>0.2</u>	0.1	<u>2.6</u>	0.1
Phenol SGV	280	-	-	-	-	-	-	-	-	-	-
Pyrene	620	<u>9.3</u>	<u>230</u>	5.3	<u>31</u>	0.1	<u>88</u>	1.7	<u>32</u>	<u>24</u>	0.4

Sample concentrations in mg/kg

Summary of Concentrations

Geology:

0.0

Site End Use:

Residential With Plant Uptake

Soil Type:

Sand - 1% SOM

Project Number CS088198

Client: Rowlinson Constructions Ltd

		31	32	33	34	35	36	37	38	39	40
Compound	GAC	BH202	BH203	BH204	BH205	BH206	BH206				
		0.50m	1.20m	0.30m	1.00m	0.50m	1.40m				
Metals											
Arsenic SGV	37	5	8	9	7	7	15	-	-	-	-
Boron	290	1	1	1	1	1	1	-	-	-	-
Cadmium SGV	11	1	1	1	1	1	1	-	-	-	-
Chromium VI	6	1	1	1	1	1	1	-	-	-	-
Copper	2400	17	26	27	27	31	57	-	-	-	-
Lead	180	88	160	170	29	160	200	-	-	-	-
Mercury SGV	1.2	1	1	1	1	1	1	-	-	-	-
Nickel SGV	180	12	16	14	38	14	26	-	-	-	-
Selenium SGV	250	3	3	3	3	3	3	-	-	-	-
Vanadium	410	19	22	26	36	25	35	-	-	-	-
Zinc	3700	82	83	150	74	230	100	-	-	-	-
Non-Metals											
Inorganic Cyanide	780	1	1	1	1	1	1	-	-	-	-
TPH											
Aliphatic C5-6	42	0.01	0.01	0.01	-	0.01	0.01	-	-	-	-
Aliphatic C6-8	100	0.01	0.035	0.01	-	0.01	0.01	-	-	-	-
Aliphatic C8-10	27	0.01	1.8	0.01	-	0.01	0.01	-	-	-	-
Aliphatic C10-12	130	1	1	1	-	1	10	-	-	-	-
Aliphatic C12-16	1100	10	7	1	-	4	10	-	-	-	-
Aliphatic C16-21	N/A	17	13	1	-	12	10	-	-	-	-
Aliphatic C21-35	N/A	29	17	2	-	100	10	-	-	-	-
Aliphatic C16-35	65000	46	30	3	-	112	20	-	-	-	-
Aromatic C8-10	34	0.032	2.5	0.2	-	0.01	0.01	-	-	-	-
Aromatic C10-12	74	2	2	2	-	2	10	-	-	-	-
Aromatic C12-16	140	9	22	1	-	5	34	-	-	-	-
Aromatic C16-21	260	29	70	7	-	26	220	-	-	-	-
Aromatic C21-35	1100	29	77	12	-	36	400	-	-	-	-
VOCs											
Benzene SGV	0.087	-	-	-	-	-	0.01	-	-	-	-
Chloroethene	0.00064	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.0071	-	-	-	-	-	-	-	-	-	-
Ethylbenzene SGV	47	-	-	-	-	-	0.28	-	-	-	-
Naphthalene	5.5	-	-	-	-	-	26	-	-	-	-
Tetrachloroethanes	0.41	-	-	-	-	-	0.05	-	-	-	-
Tetrachloroethene	0.18	-	-	-	-	-	0.05	-	-	-	-
Tetrachloromethane	0.26	-	-	-	-	-	0.05	-	-	-	-
Toluene SGV	130	-	-	-	-	-	0.036	-	-	-	-
1,1,1-Trichloroethane	8.8	-	-	-	-	-	0.05	-	-	-	-
Trichloroethene	0.016	-	-	-	-	-	-	-	-	-	-
Xylenes SGV	20	-	-	-	-	-	0.68	-	-	-	-
SVOCs											
Benz[a]anthracene	7.2	0.9	6.8	3.5	0.1	1.7	63	-	-	-	-
Benzo[a]pyrene	2.2	0.6	4.6	2.6	0.1	1.3	48	-	-	-	-
Benzo[b]fluoranthene	2.6	0.6	4	2.4	0.1	1.2	38	-	-	-	-
Benzo[ghi]perylene	320	0.4	3	1.8	0.1	1.1	33	-	-	-	-
Benzo[k]fluoranthene	77	0.4	3.9	2.1	0.1	1	38	-	-	-	-
Chrysene	15	1	8.5	4.4	0.1	2.3	79	-	-	-	-
Dibenz[ah]anthracene	0.24	0.1	0.1	0.1	0.1	0.1	9.2	-	-	-	-
Fluoranthene	280	2	18	9.7	0.1	5.6	120	-	-	-	-
Indeno[123-cd]pyrene	27	0.4	2.7	1.6	0.1	0.1	29	-	-	-	-
Naphthalene	2.3	0.3	3	1	0.1	0.1	26	-	-	-	-
Phenol SGV	280	-	-	-	-	-	-	-	-	-	-
Pyrene	620	1.9	17	9.1	0.1	5.4	120	-	-	-	-

Sample concentrations in mg/kg

Summary of Statistics

Controlled Water:

Principal Aquifer &/or SPZ

Description:

Sherwood Sandstone

Project Number:CS088198

Client: Rowlinson Constructions

Compound	GAC (µg/l)	No. Samples	Range of values (µg/l)	No. exceeding GAC	Normality	No. Outliers	Test	UCL _{95%} (of the true population mean)	Test Result
Metals									
Arsenic	10	3	1.3 - 7.4	0	Normal	None	t	10.1	FAIL
Boron	1000	3	21 - 110	0	Normal	None	t	146.2	PASS
Cadmium	3	3	0.02 - 0.02	0					
Chromium VI	50	3	1 - 4	0	Normal	None	t	5.2	PASS
Copper	2000	3	8.3 - 19	0	Normal	None	t	24.4	PASS
Lead	10	3	0.4 - 0.7	0	Normal	None	t	0.8	PASS
Mercury	1	3	0.06 - 0.1	0	Normal	None	t	0.1	PASS
Nickel	20	3	2 - 4	0	Not Normal	None	c	6.2	PASS
Selenium	10	3	0.8 - 2.2	0	Normal	None	t	2.7	PASS
Zinc	5000	3	4 - 5	0	Not Normal	None	c	6.1	PASS
Non-Metals									
Inorganic Cyanide	50	3	0.05 - 0.05	0					
TPH									
Aliphatic C5-6	N/A	3	1 - 1	0					
Aliphatic C6-8		3	1 - 1	0					
Aliphatic C8-10		3	1 - 1	0					
Aliphatic C10-12		3	1 - 20	0	Not Normal	1	c	34.9	
Aliphatic C12-16		3	1 - 20	0	Normal	1	t	25.7	
Aliphatic C16-21		3	3 - 7	0	Normal	None	t	8.4	
Aliphatic C21-35		3	6 - 26	0	Normal	1	t	31.9	
Aliphatic C16-35		3	9 - 31	0	Normal	None	t	37.5	
Aromatic C8-10		3	1 - 1	0					
Aromatic C10-12		3	2 - 4	0	Normal	None	t	4.7	
Aromatic C12-16		3	19 - 24	0	Not Normal	1	c	27.9	
Aromatic C16-21		3	28 - 41	0	Normal	None	t	44.9	
Aromatic C21-35		3	1 - 23	0	Normal	None	t	29.8	
Total TPH	10	0							
VOCs									
MTBE	5	3	1 - 1	0					
Benzene	1	3	1 - 1	0					
Chloroethene	0.5	0							
1,2-Dichloroethane	3	0							
Ethylbenzene	2	3	1 - 1	0					
Naphthalene	10	3	0.08 - 9.5	0	Normal	1	t	12.3	FAIL
Tetrachloroethanes	0.05	0							
Tetrachloroethene	10	0							
Tetrachloromethane	2	0							
Toluene	24	0							
1,1,1-Trichloroethane	100	0							
Trichloroethene	10	0							
Xylenes	20	3	1 - 1	0					
SVOCs									
Benzo[b]fluoranthene	0.1	3	0.08 - 9.5	2	Normal	1	t	12.3	FAIL
Benzo[k]fluoranthene	0.1	3	0.1 - 5.4	2	Normal	1	t	7.0	FAIL
Benzo[ghi]perylene	0.1	3	0.06 - 6.6	2	Normal	1	t	8.6	FAIL
Benzo[a]pyrene	0.01	3	0.09 - 10	3	Normal	1	t	12.9	FAIL
Indeno[123-cd]pyrene	0.1	3	0.05 - 5.3	2	Normal	1	t	6.9	FAIL
Naphthalene	10	3	0.01 - 5.8	0	Normal	1	t	7.6	PASS
Phenol	0.5	0							

Summary of Concentrations

Controlled Water:

Principal Aquifer &/or SPZ

Description:

Sherwood Sandstone

Project Number CS088198

Client: Rowlinson Constructions

		1	2	3	4	5	6	7	8	9	10
Compound	GAC	BH204	BH205	BH206							
Metals											
Arsenic	10	7.4	5.7	1.3	-	-	-	-	-	-	-
Boron	1000	110	79	21	-	-	-	-	-	-	-
Cadmium	3	0.02	0.02	0.02	-	-	-	-	-	-	-
Chromium VI	50	1	4	3	-	-	-	-	-	-	-
Copper	2000	8.3	19	17	-	-	-	-	-	-	-
Lead	10	0.5	0.4	0.7	-	-	-	-	-	-	-
Mercury	1	0.06	0.1	0.07	-	-	-	-	-	-	-
Nickel	20	2	4	4	-	-	-	-	-	-	-
Selenium	10	1.4	2.2	0.8	-	-	-	-	-	-	-
Zinc	5000	5	4	5	-	-	-	-	-	-	-
Non-Metals											
Inorganic Cyanide	50	0.05	0.05	0.05	-	-	-	-	-	-	-
TPH											
Aliphatic C5-6	N/A	1	1	1	-	-	-	-	-	-	-
Aliphatic C6-8		1	1	1	-	-	-	-	-	-	-
Aliphatic C8-10		1	1	1	-	-	-	-	-	-	-
Aliphatic C10-12		20	1	1	-	-	-	-	-	-	-
Aliphatic C12-16		20	1	2	-	-	-	-	-	-	-
Aliphatic C16-21		5	3	7	-	-	-	-	-	-	-
Aliphatic C21-35		26	6	8	-	-	-	-	-	-	-
Aliphatic C16-35		31	9	15	-	-	-	-	-	-	-
Aromatic C8-10		1	1	1	-	-	-	-	-	-	-
Aromatic C10-12		4	2	3	-	-	-	-	-	-	-
Aromatic C12-16	24	19	19	19	-	-	-	-	-	-	-
Aromatic C16-21		41	32	28	-	-	-	-	-	-	-
Aromatic C21-35		23	1	9	-	-	-	-	-	-	-
Total TPH	10	-	-	-	-	-	-	-	-	-	-
VOCs											
MTBE	5	1	1	1	-	-	-	-	-	-	-
Benzene	1	1	1	1	-	-	-	-	-	-	-
Chloroethene	0.5	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	3	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	2	1	1	1	-	-	-	-	-	-	-
Naphthalene	10	9.5	0.85	0.08	-	-	-	-	-	-	-
Tetrachloroethanes	0.05	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	10	-	-	-	-	-	-	-	-	-	-
Tetrachloromethane	2	-	-	-	-	-	-	-	-	-	-
Toluene	24	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	100	-	-	-	-	-	-	-	-	-	-
Trichloroethene	10	-	-	-	-	-	-	-	-	-	-
Xylenes	20	1	1	1	-	-	-	-	-	-	-
SVOCs											
Benzo[b]fluoranthene	0.1	9.5	0.85	0.08	-	-	-	-	-	-	-
Benzo[k]fluoranthene	0.1	5.4	0.64	0.1	-	-	-	-	-	-	-
Benzo[ghi]perylene	0.1	6.6	0.38	0.06	-	-	-	-	-	-	-
Benzo[a]pyrene	0.01	10	0.87	0.09	-	-	-	-	-	-	-
Indeno[123-cd]pyrene	0.1	5.3	0.31	0.05	-	-	-	-	-	-	-
Naphthalene	10	5.8	0.09	0.01	-	-	-	-	-	-	-
Phenol	0.5	-	-	-	-	-	-	-	-	-	-

Sample concentrations in µg/l

Summary of Statistics

Geology:

0.0

Site End Use:

Residential With Plant Uptake

Soil Type:

Sand - 1% SOM

Project Number CS088198

Client: Rowlinson Constructions Ltd

Compound	AC (mg/kg)	No. Samples	Range of values (mg/kg)	No. exceeding AC	Normality	No. Outliers	Test	UCL _{95%} (of the true population mean)	Test Result
Metals									
Arsenic SGV	37	0							
Boron	290	0							
Cadmium SGV	11	0							
Chromium VI	6	0							
Copper	2400	0							
Lead*	180	0							
Mercury SGV	1.2	0							
Nickel SGV	180	0							
Selenium SGV	250	0							
Vanadium	410	0							
Zinc	3700	0							
Non-Metals									
Inorganic Cyanide	780	0							
TPH									
Aliphatic C5-6	42	28	0.01 - 0.02	0	Not Normal	5	c	0.0	PASS
Aliphatic C6-8	100	28	0.01 - 0.82	0	Not Normal	2	c	0.2	PASS
Aliphatic C8-10	27	28	0.01 - 22	0	Not Normal	4	c	4.4	PASS
Aliphatic C10-12	130	28	1 - 34	0	Not Normal	3	c	13.0	PASS
Aliphatic C12-16	1100	28	1 - 170	0	Normal	4	t	35.8	PASS
Aliphatic C16-21	N/A	28	1 - 390	N/A	Normal	7	N/A	75.2	N/A
Aliphatic C21-35	N/A	28	2 - 270	N/A	Normal	7	N/A	75.2	N/A
Aliphatic C16-35	65000	28	3 - 530	0	Normal	10	t	146.5	PASS
Aromatic C8-10	34	28	0.01 - 3	0	Not Normal	3	c	0.7	PASS
Aromatic C10-12	74	28	2 - 53	0	Not Normal	5	c	20.2	PASS
Aromatic C12-16	140	28	1 - 420	7	Normal	None	t	127.1	PASS
Aromatic C16-21	260	28	1 - 2700	6	Normal	11	t	526.3	FAIL
Aromatic C21-35	1100	28	1 - 2900	3	Normal	9	t	588.6	PASS
VOCs									
Benzene SGV	0.087	5	1 - 12	5	Normal	2	t	8.7	FAIL
Chloroethene	0.00064	0							
1,2-Dichloroethane	0.0071	0							
Ethylbenzene SGV	47	28	1 - 230	2	Not Normal	10	c	50.5	FAIL
Naphthalene*	5.5	0							
Tetrachloroethanes*	0.41	0							
Tetrachloroethene	0.18	0							
Tetrachloromethane	0.26	0							
Toluene SGV	130	28	1 - 10	0	Not Normal	3	c	4.1	PASS
1,1,1-Trichloroethane	8.8	0							
Trichloroethene	0.016	0							
Xylenes SGV**	20	28	2 - 100	7	Not Normal	1	c	40.0	FAIL
SVOCs									
Benz[a]anthracene	7.2	28	0.1 - 150	6	Normal	5	t	27.8	FAIL
Benzo[a]pyrene	2.2	28	0.1 - 120	13	Normal	6	t	22.3	FAIL
Benzo[b]fluoranthene	2.6	28	0.1 - 95	13	Normal	6	t	20.2	FAIL
Benzo[ghi]perylene	320	28	0.1 - 72	0	Normal	5	t	13.3	PASS
Benzo[k]fluoranthene	77	28	0.1 - 95	2	Normal	6	t	20.2	PASS
Chrysene	15	28	0.1 - 140	5	Normal	5	t	26.6	FAIL
Dibenz[ah]anthracene	0.24	28	0.1 - 17	13	Not Normal	5	c	5.2	FAIL
Fluoranthene	280	28	0.1 - 370	1	Normal	5	t	65.5	PASS
Indeno[123-cd]pyrene	27	28	0.1 - 57	3	Normal	5	t	11.0	PASS
Naphthalene	2.3	28	0.1 - 120	6	Not Normal	7	c	33.2	FAIL
Phenol SGV	280	0							
Pyrene	620	28	0.1 - 360	0	Normal	5	t	63.2	PASS

Summary of Concentrations

Geology:

0.0

Site End Use:

Residential With Plant Uptake

Soil Type:

Sand - 1% SOM

Project Number CS088198

Client: Rowlinson Constructions Ltd

		1	2	3	4	5	6	7	8	9	10
Compound	GAC	TP301	TP302	TP303	TP303	TP304	TP305	TP306	TP307	TP308	TP309
		1.30m	1.40m	0.50m	2.00m	1.00m	1.00m	0.70m	0.80m	0.60m	0.70m
Metals											
Arsenic SGV	37	-	-	-	-	-	-	-	-	-	-
Boron	290	-	-	-	-	-	-	-	-	-	-
Cadmium SGV	11	-	-	-	-	-	-	-	-	-	-
Chromium VI	6	-	-	-	-	-	-	-	-	-	-
Copper	2400	-	-	-	-	-	-	-	-	-	-
Lead	180	-	-	-	-	-	-	-	-	-	-
Mercury SGV	1.2	-	-	-	-	-	-	-	-	-	-
Nickel SGV	180	-	-	-	-	-	-	-	-	-	-
Selenium SGV	250	-	-	-	-	-	-	-	-	-	-
Vanadium	410	-	-	-	-	-	-	-	-	-	-
Zinc	3700	-	-	-	-	-	-	-	-	-	-
Non-Metals											
Inorganic Cyanide	780	-	-	-	-	-	-	-	-	-	-
TPH											
Aliphatic C5-6	42	0.01	0.01	0.01	<u>0.016</u>	0.01	0.01	0.01	0.01	<u>0.015</u>	0.01
Aliphatic C6-8	100	0.01	0.01	0.01	<u>0.045</u>	0.01	0.01	0.01	0.01	0.01	0.01
Aliphatic C8-10	27	<u>0.3</u>	0.01	0.01	<u>1.6</u>	0.01	0.01	0.01	0.01	0.01	0.01
Aliphatic C10-12	130	<u>32</u>	1	10	2	10	1	10	1	10	1
Aliphatic C12-16	1100	<u>86</u>	3	10	4	17	1	10	5	10	2
Aliphatic C16-21	N/A	<u>230</u>	9	13	5	<u>62</u>	1	18	5	<u>77</u>	7
Aliphatic C21-35	N/A	<u>270</u>	15	50	60	<u>100</u>	35	59	13	<u>140</u>	15
Aliphatic C16-35	65000	<u>500</u>	24	<u>63</u>	<u>65</u>	<u>162</u>	36	<u>77</u>	18	<u>217</u>	22
Aromatic C8-10	34	0.064	0.39	0.37	<u>0.64</u>	0.35	0.01	0.065	0.01	0.01	0.01
Aromatic C10-12	74	<u>40</u>	6	<u>31</u>	2	<u>27</u>	2	13	2	10	2
Aromatic C12-16	140	<u>320</u>	42	<u>160</u>	1	<u>350</u>	1	<u>240</u>	21	<u>420</u>	5
Aromatic C16-21	260	<u>860</u>	<u>160</u>	<u>420</u>	2	<u>1400</u>	2	<u>880</u>	<u>89</u>	<u>2700</u>	19
Aromatic C21-35	1100	<u>760</u>	<u>200</u>	<u>530</u>	1	<u>1700</u>	1	<u>1100</u>	140	<u>2900</u>	32
VOCs											
Benzene SGV	0.087	-	<u>12</u>	<u>1</u>	-	<u>2</u>	-	<u>2</u>	-	-	-
Chloroethene	0.00064	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.0071	-	-	-	-	-	-	-	-	-	-
Ethylbenzene SGV	47	1	<u>24</u>	<u>18</u>	1	<u>11</u>	1	<u>6</u>	1	1	1
Naphthalene	5.5	-	-	-	-	-	-	-	-	-	-
Tetrachloroethanes	0.41	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	0.18	-	-	-	-	-	-	-	-	-	-
Tetrachloromethane	0.26	-	-	-	-	-	-	-	-	-	-
Toluene SGV	130	1	<u>8</u>	3	1	<u>7</u>	1	3	1	1	1
1,1,1-Trichloroethane	8.8	-	-	-	-	-	-	-	-	-	-
Trichloroethene	0.016	-	-	-	-	-	-	-	-	-	-
Xylenes SGV	20	5	<u>100</u>	<u>43</u>	18	<u>64</u>	2	13	2	2	2
SVOCs											
Benz[a]anthracene	7.2	6.7	<u>150</u>	<u>85</u>	0.1	<u>49</u>	0.1	<u>96</u>	3.1	6.6	1.3
Benzo[a]pyrene	2.2	<u>5.8</u>	<u>120</u>	<u>73</u>	0.1	<u>35</u>	0.1	<u>74</u>	<u>2.4</u>	<u>4.9</u>	1
Benzo[b]fluoranthene	2.6	<u>4.5</u>	<u>89</u>	<u>50</u>	0.1	<u>30</u>	0.1	<u>95</u>	<u>2.7</u>	<u>6</u>	1.3
Benzo[ghi]perylene	320	3.2	<u>72</u>	<u>40</u>	0.1	<u>22</u>	0.1	<u>47</u>	1.4	2.3	0.6
Benzo[k]fluoranthene	77	4.5	<u>89</u>	<u>50</u>	0.1	<u>30</u>	0.1	<u>95</u>	2.7	6	1.3
Chrysene	15	6.4	<u>140</u>	<u>80</u>	0.1	<u>43</u>	0.1	<u>100</u>	2.7	6.3	1.2
Dibenz[ah]anthracene	0.24	<u>1</u>	<u>17</u>	<u>9.8</u>	0.1	<u>5</u>	0.1	<u>11</u>	<u>0.3</u>	<u>0.7</u>	0.1
Fluoranthene	280	16	<u>370</u>	<u>180</u>	0.2	<u>110</u>	0.1	<u>230</u>	6.2	14	2.8
Indeno[123-cd]pyrene	27	2.7	<u>57</u>	<u>32</u>	0.1	<u>19</u>	0.1	<u>41</u>	1.2	2.1	0.5
Naphthalene	2.3	1	<u>120</u>	<u>73</u>	0.1	<u>22</u>	0.1	<u>57</u>	0.2	0.4	0.2
Phenol SGV	280	-	-	-	-	-	-	-	-	-	-
Pyrene	620	15	<u>360</u>	<u>180</u>	0.2	<u>100</u>	0.1	<u>220</u>	6.1	13	2.6

Sample concentrations in mg/kg

Summary of Concentrations

Geology:

0.0

Site End Use:

Residential With Plant Uptake

Soil Type:

Sand - 1% SOM

Project Number CS088198

Client: Rowlinson Constructions Ltd

		11	12	13	14	15	16	17	18	19	20
Compound	GAC	TP310	TP311	TP312	TP313	TP314	TP315	TP316	TP317	TP318	TP319
		2.10m	0.70m	1.80m	0.40m	0.60m	0.80m	0.70m	0.80m	2.55m	1.40m
Metals											
Arsenic SGV	37	-	-	-	-	-	-	-	-	-	-
Boron	290	-	-	-	-	-	-	-	-	-	-
Cadmium SGV	11	-	-	-	-	-	-	-	-	-	-
Chromium VI	6	-	-	-	-	-	-	-	-	-	-
Copper	2400	-	-	-	-	-	-	-	-	-	-
Lead	180	-	-	-	-	-	-	-	-	-	-
Mercury SGV	1.2	-	-	-	-	-	-	-	-	-	-
Nickel SGV	180	-	-	-	-	-	-	-	-	-	-
Selenium SGV	250	-	-	-	-	-	-	-	-	-	-
Vanadium	410	-	-	-	-	-	-	-	-	-	-
Zinc	3700	-	-	-	-	-	-	-	-	-	-
Non-Metals											
Inorganic Cyanide	780	-	-	-	-	-	-	-	-	-	-
TPH											
Aliphatic C5-6	42	0.015	0.01	0.01	0.01	0.016	0.02	0.01	0.01	0.01	0.01
Aliphatic C6-8	100	0.01	0.01	0.01	0.01	0.01	0.82	0.01	0.01	0.01	0.01
Aliphatic C8-10	27	0.01	0.01	0.01	0.01	0.01	22	0.01	0.01	0.01	0.01
Aliphatic C10-12	130	1	1	1	1	1	15	10	1	1	1
Aliphatic C12-16	1100	2	17	5	3	1	170	39	6	1	2
Aliphatic C16-21	N/A	9	31	12	4	2	390	150	11	1	4
Aliphatic C21-35	N/A	7	170	13	5	5	140	200	14	2	4
Aliphatic C16-35	65000	16	201	25	9	7	530	350	25	3	8
Aromatic C8-10	34	0.39	0.063	0.05	0.01	0.01	3	0.17	0.012	0.01	0.01
Aromatic C10-12	74	2	2	2	2	2	20	53	2	2	2
Aromatic C12-16	140	6	16	42	4	4	200	390	11	1	6
Aromatic C16-21	260	18	73	230	12	17	180	1600	39	1	26
Aromatic C21-35	1100	26	100	310	20	27	120	1700	49	1	38
VOCs											
Benzene SGV	0.087	-	-	-	-	-	5	-	-	-	-
Chloroethene	0.00064	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.0071	-	-	-	-	-	-	-	-	-	-
Ethylbenzene SGV	47	65	2	2	1	1	230	10	1	1	1
Naphthalene	5.5	-	-	-	-	-	-	-	-	-	-
Tetrachloroethanes	0.41	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	0.18	-	-	-	-	-	-	-	-	-	-
Tetrachloromethane	0.26	-	-	-	-	-	-	-	-	-	-
Toluene SGV	130	10	2	1	1	1	2	3	1	1	1
1,1,1-Trichloroethane	8.8	-	-	-	-	-	-	-	-	-	-
Trichloroethene	0.016	-	-	-	-	-	-	-	-	-	-
Xylenes SGV	20	63	12	8	2	2	58	24	2	2	2
SVOCs											
Benz[a]anthracene	7.2	0.4	24	3.8	0.7	0.5	0.9	4.5	1	0.1	3.4
Benzo[a]pyrene	2.2	0.3	20	3	0.5	0.4	0.7	3.5	0.8	0.1	2.9
Benzo[b]fluoranthene	2.6	0.4	24	3.2	0.7	0.5	0.9	4.3	1	0.1	3.4
Benzo[ghi]perylene	320	0.2	14	1.7	0.3	0.3	0.4	2	0.4	0.1	1.7
Benzo[k]fluoranthene	77	0.4	24	3.2	0.7	0.5	0.9	4.3	1	0.1	3.4
Chrysene	15	0.4	24	3.1	0.7	0.5	0.9	4.1	1	0.1	3.5
Dibenz[ah]anthracene	0.24	0.1	2.9	0.4	0.1	0.1	0.1	0.5	0.1	0.1	0.4
Fluoranthene	280	1.2	60	8	1.8	1.2	2.1	10	2.6	0.1	7.8
Indeno[123-cd]pyrene	27	0.1	12	1.5	0.2	0.2	0.3	1.7	0.4	0.1	1.4
Naphthalene	2.3	1.1	8.5	1	0.2	0.1	0.1	3.2	0.6	0.1	0.4
Phenol SGV	280	-	-	-	-	-	-	-	-	-	-
Pyrene	620	1	55	7.7	1.7	1.2	2	9.4	2.4	0.1	7.6

Sample concentrations in mg/kg

Summary of Concentrations

Geology:

0.0

Site End Use:

Residential With Plant Uptake

Soil Type:

Sand - 1% SOM

Project Number CS088198

Client: Rowlinson Constructions Ltd

		21	22	23	24	25	26	27	28	29	30
Compound	GAC	TP319	TP320	TP321	TP321	TP322	TP323	TP324	TP325		
		2.80m	1.20m	1.00m	2.70m	0.90m	0.50m	0.50m	1.00m		
Metals											
Arsenic SGV	37	-	-	-	-	-	-	-	-	-	-
Boron	290	-	-	-	-	-	-	-	-	-	-
Cadmium SGV	11	-	-	-	-	-	-	-	-	-	-
Chromium VI	6	-	-	-	-	-	-	-	-	-	-
Copper	2400	-	-	-	-	-	-	-	-	-	-
Lead	180	-	-	-	-	-	-	-	-	-	-
Mercury SGV	1.2	-	-	-	-	-	-	-	-	-	-
Nickel SGV	180	-	-	-	-	-	-	-	-	-	-
Selenium SGV	250	-	-	-	-	-	-	-	-	-	-
Vanadium	410	-	-	-	-	-	-	-	-	-	-
Zinc	3700	-	-	-	-	-	-	-	-	-	-
Non-Metals											
Inorganic Cyanide	780	-	-	-	-	-	-	-	-	-	-
TPH											
Aliphatic C5-6	42	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-
Aliphatic C6-8	100	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-
Aliphatic C8-10	27	0.01	0.01	<u>2.9</u>	0.01	0.01	0.01	0.01	0.01	-	-
Aliphatic C10-12	130	1	1	<u>34</u>	1	1	2	1	10	-	-
Aliphatic C12-16	1100	7	6	<u>170</u>	2	3	3	1	10	-	-
Aliphatic C16-21	N/A	11	16	<u>200</u>	3	5	4	1	10	-	-
Aliphatic C21-35	N/A	2	25	<u>86</u>	9	2	11	3	14	-	-
Aliphatic C16-35	65000	13	41	<u>286</u>	12	7	15	4	24	-	-
Aromatic C8-10	34	0.01	0.023	<u>0.63</u>	0.024	0.01	0.01	0.01	0.01	-	-
Aromatic C10-12	74	2	2	<u>13</u>	2	2	2	2	10	-	-
Aromatic C12-16	140	1	8	<u>51</u>	1	4	13	5	25	-	-
Aromatic C16-21	260	1	48	<u>14</u>	1	19	64	29	<u>150</u>	-	-
Aromatic C21-35	1100	1	79	<u>17</u>	1	26	97	52	<u>260</u>	-	-
VOCs											
Benzene SGV	0.087	-	-	-	-	-	-	-	-	-	-
Chloroethene	0.00064	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.0071	-	-	-	-	-	-	-	-	-	-
Ethylbenzene SGV	47	1	1	<u>9</u>	1	1	1	1	1	-	-
Naphthalene	5.5	-	-	-	-	-	-	-	-	-	-
Tetrachloroethanes	0.41	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	0.18	-	-	-	-	-	-	-	-	-	-
Tetrachloromethane	0.26	-	-	-	-	-	-	-	-	-	-
Toluene SGV	130	1	1	<u>3</u>	1	1	1	1	1	-	-
1,1,1-Trichloroethane	8.8	-	-	-	-	-	-	-	-	-	-
Trichloroethene	0.016	-	-	-	-	-	-	-	-	-	-
Xylenes SGV	20	2	4	<u>60</u>	2	2	3	2	2	-	-
SVOCs											
Benz[a]anthracene	7.2	1.1	1.5	1.2	0.1	1.4	<u>8.1</u>	0.6	<u>5</u>	-	-
Benzo[a]pyrene	2.2	0.7	1.2	0.9	0.1	1.2	<u>7</u>	0.6	<u>4.9</u>	-	-
Benzo[b]fluoranthene	2.6	0.9	1.5	1.3	0.1	1.5	<u>10</u>	0.7	<u>5.4</u>	-	-
Benzo[ghi]perylene	320	0.4	0.7	0.6	0.1	0.8	<u>3.3</u>	0.3	<u>2.5</u>	-	-
Benzo[k]fluoranthene	77	0.9	1.5	1.3	0.1	1.5	<u>10</u>	0.7	<u>5.4</u>	-	-
Chrysene	15	1	1.4	1.1	0.1	1.3	<u>6.7</u>	0.7	<u>4.5</u>	-	-
Dibenz[ah]anthracene	0.24	0.1	0.2	0.1	0.1	0.2	<u>0.9</u>	0.1	<u>1</u>	-	-
Fluoranthene	280	3.2	3.1	2.6	0.1	3.2	<u>13</u>	1.3	<u>10</u>	-	-
Indeno[123-cd]pyrene	27	0.3	0.6	0.5	0.1	0.7	<u>3</u>	0.3	<u>2.1</u>	-	-
Naphthalene	2.3	0.1	0.4	<u>1.6</u>	0.1	0.1	0.5	0.1	<u>1</u>	-	-
Phenol SGV	280	-	-	-	-	-	-	-	-	-	-
Pyrene	620	2.9	2.9	2.4	0.1	2.9	<u>13</u>	1.2	<u>10</u>	-	-

Sample concentrations in mg/kg

Summary of Statistics

Controlled Water:

Principal Aquifer &/or SPZ

Description:

Sherwood Sandstone

Project Number:CS088198

Client: Rowlinson Constructions

Compound	GAC (µg/l)	No. Samples	Range of values (µg/l)	No. exceeding GAC	Normality	No. Outliers	Test	UCL _{95%} (of the true population mean)	Test Result
Metals									
Arsenic	10	3	1.2 - 20	1	Normal	None	t	25.5	FAIL
Boron	1000	3	110 - 700	0	Normal	None	t	911.3	PASS
Cadmium	3	3	0.04 - 0.12	0	Normal	None	t	0.2	PASS
Chromium VI	50	3	1 - 1	0					
Copper	2000	3	0.5 - 2.3	0	Normal	None	t	2.8	PASS
Lead	10	3	0.3 - 0.3	0					
Mercury	1	3	0.05 - 0.06	0	Not Normal	1	c	0.1	PASS
Nickel	20	3	11 - 88	2	Normal	None	t	121.9	FAIL
Selenium	10	3	0.5 - 1	0	Not Normal	1	c	1.4	PASS
Zinc	5000	3	7 - 14	0	Not Normal	1	c	19.5	PASS
Non-Metals									
Inorganic Cyanide	50	3	50 - 50	0					
TPH									
Aliphatic C5-6	N/A	3	10 - 10	0					
Aliphatic C6-8		3	10 - 10	0					
Aliphatic C8-10		3	10 - 10	0					
Aliphatic C10-12		3	10 - 20	0	Not Normal	None	c	31.2	
Aliphatic C12-16		3	10 - 140	0	Normal	1	t	178.6	
Aliphatic C16-21		3	10 - 110	0	Normal	1	t	139.5	
Aliphatic C21-35		3	20 - 410	0	Normal	None	t	524.4	
Aliphatic C16-35		3	40 - 520	0	Normal	1	t	662.3	
Aromatic C8-10		3	10 - 10	0					
Aromatic C10-12		3	20 - 60	0	Normal	None	t	73.7	
Aromatic C12-16		3	20 - 240	0	Normal	None	t	332.8	
Aromatic C16-21		3	20 - 570	0	Normal	None	t	890.3	
Aromatic C21-35		3	20 - 80	0	Not Normal	1	c	127.2	
Total TPH	10	0							
VOCs									
MTBE	5	0							
Benzene	1	3	1 - 1	0					
Chloroethene	0.5	0							
1,2-Dichloroethane	3	0							
Ethylbenzene	2	3	1 - 1	0					
Naphthalene	10	0							
Tetrachloroethanes	0.05	0							
Tetrachloroethene	10	0							
Tetrachloromethane	2	0							
Toluene	24	3	1 - 1	0					
1,1,1-Trichloroethane	100	0							
Trichloroethene	10	0							
Xylenes	20	3	2 - 2	0					
SVOCs									
Benzo[b]fluoranthene	0.1	3	0.02 - 0.12	1	Normal	None	t	0.1	FAIL
Benzo[k]fluoranthene	0.1	3	0.01 - 0.1	0	Normal	1	t	0.1	FAIL
Benzo[ghi]perylene	0.1	3	0.02 - 0.1	0	Not Normal	1	c	0.2	FAIL
Benzo[a]pyrene	0.01	3	0.02 - 0.12	3	Normal	None	t	0.1	FAIL
Indeno[123-cd]pyrene	0.1	3	0.01 - 0.08	0	Normal	None	t	0.1	FAIL
Naphthalene	10	3	0.02 - 0.11	0	Normal	None	t	0.1	PASS
Phenol	0.5	0							

Summary of Concentrations

Controlled Water:

Principal Aquifer &/or SPZ

Description:

Sherwood Sandstone

Project Number CS088198

Client: Rowlinson Constructions

		1	2	3	4	5	6	7	8	9	10
Compound	GAC	BH301	BH302	BH301 (24th Feb) 5.05m							
Metals											
Arsenic	10	4.6	1.2	20	-	-	-	-	-	-	-
Boron	1000	700	110	430	-	-	-	-	-	-	-
Cadmium	3	0.12	0.04	0.11	-	-	-	-	-	-	-
Chromium VI	50	1	1	1	-	-	-	-	-	-	-
Copper	2000	0.8	2.3	0.5	-	-	-	-	-	-	-
Lead	10	0.3	0.3	0.3	-	-	-	-	-	-	-
Mercury	1	0.06	0.05	0.05	-	-	-	-	-	-	-
Nickel	20	88	11	66	-	-	-	-	-	-	-
Selenium	10	0.5	0.5	1	-	-	-	-	-	-	-
Zinc	5000	14	7	7	-	-	-	-	-	-	-
Non-Metals											
Inorganic Cyanide	50	50	50	50	-	-	-	-	-	-	-
TPH											
Aliphatic C5-6	N/A	10	10	10	-	-	-	-	-	-	-
Aliphatic C6-8		10	10	10	-	-	-	-	-	-	-
Aliphatic C8-10		10	10	10	-	-	-	-	-	-	-
Aliphatic C10-12		20	20	10	-	-	-	-	-	-	-
Aliphatic C12-16		140	20	10	-	-	-	-	-	-	-
Aliphatic C16-21		110	20	10	-	-	-	-	-	-	-
Aliphatic C21-35		410	20	70	-	-	-	-	-	-	-
Aliphatic C16-35		520	40	80	-	-	-	-	-	-	-
Aromatic C8-10		10	10	10	-	-	-	-	-	-	-
Aromatic C10-12		60	20	40	-	-	-	-	-	-	-
Aromatic C12-16		240	20	170	-	-	-	-	-	-	-
Aromatic C16-21		530	20	570	-	-	-	-	-	-	-
Aromatic C21-35		20	20	80	-	-	-	-	-	-	-
Total TPH	10	-	-	-	-	-	-	-	-	-	-
VOCs											
MTBE	5	-	-	-	-	-	-	-	-	-	-
Benzene	1	1	1	1	-	-	-	-	-	-	-
Chloroethene	0.5	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	3	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	2	1	1	1	-	-	-	-	-	-	-
Naphthalene	10	-	-	-	-	-	-	-	-	-	-
Tetrachloroethanes	0.05	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	10	-	-	-	-	-	-	-	-	-	-
Tetrachloromethane	2	-	-	-	-	-	-	-	-	-	-
Toluene	24	1	1	1	-	-	-	-	-	-	-
1,1,1-Trichloroethane	100	-	-	-	-	-	-	-	-	-	-
Trichloroethene	10	-	-	-	-	-	-	-	-	-	-
Xylenes	20	2	2	2	-	-	-	-	-	-	-
SVOCs											
Benzo[b]fluoranthene	0.1	0.12	0.04	0.02	-	-	-	-	-	-	-
Benzo[k]fluoranthene	0.1	0.1	0.02	0.01	-	-	-	-	-	-	-
Benzo[ghi]perylene	0.1	0.1	0.02	0.02	-	-	-	-	-	-	-
Benzo[a]pyrene	0.01	0.12	0.04	0.02	-	-	-	-	-	-	-
Indeno[123-cd]pyrene	0.1	0.08	0.02	0.01	-	-	-	-	-	-	-
Naphthalene	10	0.04	0.02	0.11	-	-	-	-	-	-	-
Phenol	0.5	-	-	-	-	-	-	-	-	-	-

Sample concentrations in µg/l

Appendix F Gas Monitoring Dataset

CAPITA

ATMOS PRES./TREND* BG O₂

%

%

Steady

Overcast

OPERATOR: AW

[illegible]

CAPITA

ATMOS PRES./TREND* BG O₂

%

%

Steady

Overcast

OPERATOR: AW

[illegible]

Gas & Groundwater Monitoring Record Sheet



PROJECT: Bowes Street, Manchester
PROJECT No: CS088198
CLIENT: Rowlinson Construction

DATE: 08/12/2016

ATMOS PRES./TREND* BG O₂

START: 12:30

1014 mb

20.8 %

FINISH: 13:30

1012 mb

20.6 %

Falling

INSTRUMENT: Gas Data Ltd. GFM435 Multi Gas Analyser

GROUND/WEATHER CONDITIONS:

Wet & overcast

OPERATOR: EY

[illegible]

CAPITA

ATMOS PRES./TREND* BG O₂

20.6 %

20.4 %

Overcast

OPERATOR: AW

Monitoring Visit 10/01/2017 - Sheet 6 of 8

CAPITA

20.4 %

GROUND/WEATHER CONDITIONS: Overcast & windy

Monitoring Visit 13/02/2017 - Sheet 7 of 8

CAPITA

OPERATOR: AW

Monitoring Visit 20/02/2017 - Sheet 8 of 8

Capita Property and Infrastructure Ltd

Clemence House
9 Mellor Road
Cheadle Hulme
Cheshire SK8 5AT

Tel +44 (0)161 486 1521

www.capita.com